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AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

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AUTOMOTIVE INDUSTRIES

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NEW YORK—THURSDAY, FEBRUARY 14, 1918—CHICAGO

No. 7

Twin Cities Stage First AUTOMOTIVE SHOW

Cars, Trucks, Tractors, Accessories and Farm Equipment
Assembled in Greatest Show of Its Kind Ever Held
—Dealers and Distributers Grasp Automotive
Idea—Attendance Breaks All Records

By David Beecroft

TWIN CITIES, MINN., Feb. 9—It has remained for the great Northwest, the land of the late James J. Hill, to stage the first automotive show in America, and while this first attempt is not complete it is sufficiently automotive to demonstrate unmistakably that already a new regime has taken hold of the show movement.

A five-ring automotive show is being staged here in the large Overland building, which offers 286,000 sq. ft. of floor area, which is much larger than that of either Chicago or New York. There are literally five shows in one and yet there is room to spare.

There is a show of automobiles, 46 exhibitors being present. There is a show of motor trucks with 25 exhibitors on hand. There is a show of farm tractors with 40 firms exhibiting their different models. There is a big accessory exhibit with one hundred and fifty stands.

Lastly and perhaps not automotive, and yet on

hand because of the magnetism of the automotive movement, there are more than a score of concerns participating in what is called the industrial end of the show with exhibits made up of food products, etc.

The automotive idea falls short in that there is no motorcycle representation, but this was merely an oversight. There are two airplane exhibits of model machines, etc. There is one motor boat exhibit, but there is scarcely any other city in the country better positioned for motor-boat work than Minneapolis and St. Paul, nestled as they are in one of the greatest lake areas.

Another year both of these ends of the automotive idea will surely be on hand. The house lighting idea is here stronger than at any other show and falls quite within the circle.

Not only has the automotive idea possessed our manufacturers but it is rapidly possessing the distributers and dealers of

Attendance at the Show

<i>Saturday</i>	18,021
<i>Monday</i>	28,950
<i>Tuesday</i>	29,001
<i>Wednesday</i>	29,218
<i>Thursday</i>	30,012
<i>Friday</i>	29,617
<i>Saturday</i>	18,415
<i>Total</i>	178,270



The Twin Cities show is the first real AUTOMOTIVE show, this view showing the tractor exhibit, which was staged in a mammoth room measuring 185 by 200 feet

this northwest area a distribution zone of 400,000 sq. miles, one of the largest areas served by any group of automotive distributors in America.

Already hundreds of these dealers have for some years been selling motor trucks and more are taking on trucks each year.

For the last year quite a number have been selling farm tractors and the 40 tractor makers exhibiting frankly state that they are looking for automobile men to handle the tractors in that they are well fitted to care for the internal combustion engine as used in the tractor.

The house lighting equipment has been generally taken up by the dealer and should soon be entirely in his hands; he is the logical man for it. The same is going to apply to the motorcycle and the motor boat.

That the public has already taken hold of the automotive idea is evidenced by the attendance, which is a record breaker for a Twin Cities show. Although the show is located in the middle of the 12-mile avenue which connects the two cities, so that it requires 35 minutes to reach it in a motor cab, the at-

tendance is far beyond that of any other year. The huge Overland storage building, the largest storage depot in the Northwest, was crowded from opening until closing each day.

The big restaurant in the basement made it convenient to spend the entire day at the show and if one got tired looking at automotive apparatus there was a movie show in the basement. For those who wished to dance there was a great dancing floor.

So completely had the Twin Cities distributors and dealers gone into the subject that they evolved the greatest transportation exhibit this country has known and unconsciously broadened the automobile sphere into the automotive, but not before the idea had already spread generally throughout the cities, towns and farms of the Northwest.

The automotive idea is one bred in the minds of the people by the natural and logical grouping of the apparatus and is not some outside idea that the show is attempting to inject into this section.

The idea was in this territory before the present show was thought of. It is the natural evolution of the explosion type engine.

Farmer Chief Buyer in Twin Cities Territory

Forty Per Cent of Cars Are Owned by Farmers, But 75,000 Still Have No Cars—Immense Market for Trucks and Tractors

ATTEendance figures testify best as to the hold the automotive idea has already established on the minds of the people. The total registered attendance for the seven days was 178,270, as compared with a total at the automobile show a year ago of 67,212. There were five days this year when the attendance was close to 30,000, or when the attendance each day was nearly one-half that of the entire week last year.

Such attendance figures tell a dominant story, namely: the citizens of the Northwest are not surfeited with auto-

mobiles, and in spite of war and the sacrifices of war the necessity of automotive apparatus is numerically three times what it was a year ago.

Over 5000 dealers from the territory had registered with the show management by Thursday evening, which was nearly 1000 more than for the whole week last year. The country bankers who were invited to attend by the show management had registered to the number of 2500, as compared with 2000 registrations a year ago.

There is no question but that the farm tractors and

the trucks were largely responsible for the greatly increased attendance. Still another factor must be considered, namely, that the show this year was held at a point midway between St. Paul and Minneapolis, and so drew heavily from both cities; but with all of these matters given due consideration, the attendance figures are still far above the attendance at shows last year in this zone. The necessity of motor apparatus on the farm is the big deduction from the attendance.

The analysis of automobile registrations in Minnesota during the past year shows an increasing sale of automobiles to farmers as compared with residents of cities. To-day approximately one-half of the farmers of the State of Minnesota own cars. Of the total automobile registration in the State of 184,600 cars on Jan. 1, 1918, 73,900 are owned by farmers, or 40 per cent.

Assuming that these 73,900 automobiles are distributed one to a farm, it means that almost one-half of the farmers own cars, and that, not counting replacement sales, there remain approximately 75,000 farmers who are not car owners.

The sale of automobiles in the State during the past calendar year approximated 40,000 cars, so that the farmer demand alone should absorb this allotment for the next 2 years. But in the Northwest the cities benefit very directly, too, and, where sales to the farmer increase, sales to city residents also increase.

According to *The Farmer*, the three large cities of Minnesota, namely, Minneapolis, St. Paul and Duluth, have 750,000 of the total State population of 2,500,000. Nearly one-third of the population is located in these cities, and the registration of automobiles in them is one-quarter of the total State registration.

The majority of the cars of the State are owned in the smaller cities and towns. An analysis of the State registration to date shows 41 per cent of the automobiles registered in towns of 1000 population and under. Further analysis shows that 65 per cent of all registrations are in towns of 5000 population or under.

In the 1917 calendar year there were approximately 40,000 automobiles sold in the State, which is a bigger sale than made in any previous year, these figures indicating an increase of perhaps 15 per cent over 1916. The State had hoped for 200,000 registrations by the first of this year, but the difficulty of getting cars during the selling season of the last two years made the fulfillment

of this wish an impossibility. The cars could have been sold, but they could not be obtained. The registration totals for each year since 1909, when registration was started, follow:

1909.....	7,000	1914.....	68,500
1910.....	12,500	1915.....	94,000
1911.....	19,000	1916.....	138,000
1912.....	28,400	1917.....	184,600
1913.....	45,800		

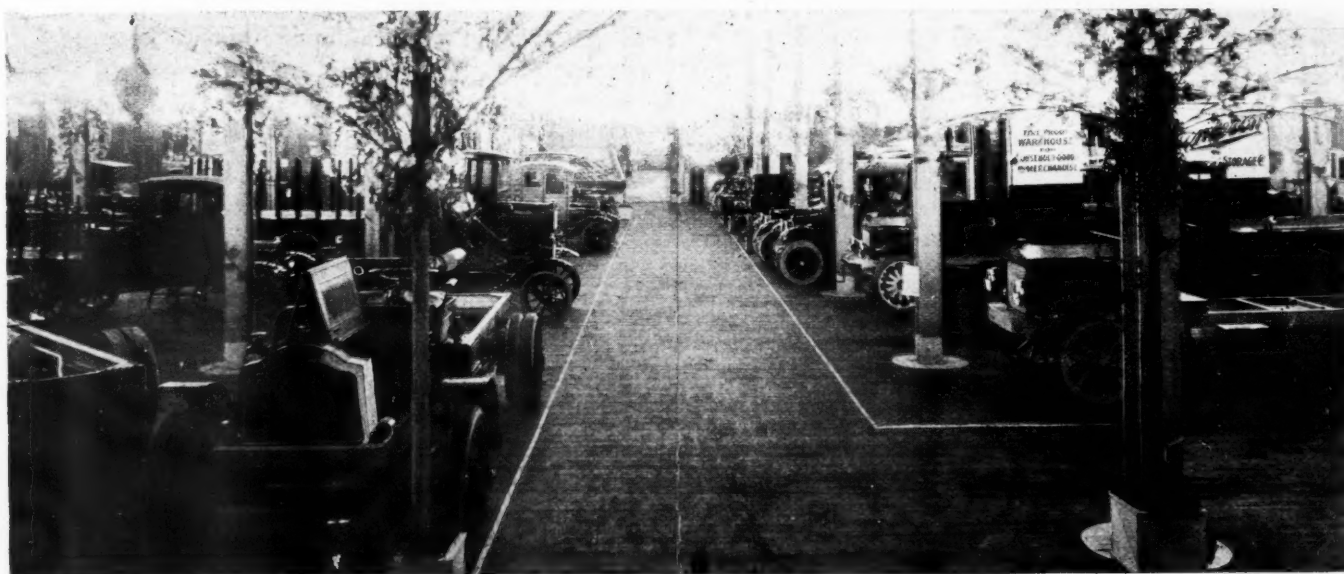
These figures indicate a steady increase each year for the past eight seasons, with three prominent seasons so far as increase in sales over preceding seasons goes. The year 1914 showed a big increase over 1913 and 1916 showed a big increase over 1915, and 1917 showed a heavy increase over 1916.

For two years the Northwest has suffered because of not being able to get enough cars, and the Pence company, Buick distributor for the States of Minnesota, North Dakota, South Dakota and Montana, started last April to get more cars than it was possible to obtain through regular shipping facilities, and incidentally exhibited one aspect of the push spirit of the Northwest.

In April the assembly of Buick cars was started in Minneapolis, and to-day Pence has a large three-story assembly factory in Minneapolis in which he has capacity for forty cars per day. Since July 1 over 2700 Buicks have been assembled, as against 450 machines shipped assembled from the factory in the same period.

The assembly building, 222 by 150 ft., is a three-story brick structure, alongside of which are two loading and two unloading railroad switches built specially for this job. The scheme of assembly is well laid out with metal tracks to guide the assembly trucks on which the chassis progress. There are overhead cranes to mount axles, engines and other parts. From this assembly floor the chassis move directly into a large steam cleaning room and then to the paint floor, where they are sprayed as in the factory. There is a drying oven that accommodates 36 chassis.

Only two models are assembled, the small six and the four cylinder, and these only in touring bodies. The bodies on the small four are enameled at the factory and are shipped ready to attach, but the bodies on the small six are painted by Pence, and he accelerates sales by furnishing color options that cannot be obtained from the



The truck exhibit at the Twin Cities show was only slightly smaller than the tractor exhibit and was placed in a room which measured 160 by 200 feet



Only one room at the Twin Cities show was devoted exclusively to passenger cars. Like the other exhibits, this was of truly heroic size, the room measuring 185 by 200 feet

factory. This color option is popular chiefly in Montana and the Dakotas, where as much brilliance in car finish is found as in any Eastern city.

Good economy in shipments is made by Pence in that the factory ships the materials in units, Pence aiming always to carry a stock of car units for two weeks' assembly. With the exception of the frames, which come direct from the frame maker, all car units come from Flint. These parts are shipped in carload lots; thus there is a carload of engines, another of axles, another of tops, another of bodies, and others of miscellaneous parts. It is possible to use 36-ft., small-door railroad cars, and in each can be carried the parts for 10 automobiles. This size of railroad car could not be used for shipping complete cars.

The economy of shipping ten automobiles in one small freight car appears when you recall that you can only ship four Buick cars, assembled, in one 40-foot railroad car.

The shipping capacity of a railroad car is increased over two and one-half times.

It is possible to ship 24 bodies in one car; forty motors can be shipped in a car; and other parts are shipped in carload lots, even to wheels mounted with tires that are inflated at Flint.

The example of the Pence company unquestionably will be generally imitated by other distributors serving large territories. It is one way in which you can obtain cars when it is not possible to get flat cars or automobile railroad cars to ship them in. It is equivalent to more than doubling railroad capacity so far as automobile shipments go. By this assembly plan Pence is able to get ahead on cars for his 450 dealers, and already is storing cars for dealers in many parts of the territory.

The distributing territory known as the Northwest must be seen to be appreciated. It embraces in the four States, Minnesota, two Dakotas and Montana, nearly 400,000 sq. miles. This represents a larger area than all of France. It is practically six times as large as the New England States, served by the Boston distributors.

James J. Hill once gave a good indication of the area served by the Twin Cities. He said that if you take the map of the United States, and, with Twin Cities as the center, draw a circle that cuts Jacksonville on the southeast, that circle on the west will not be outside of the Minneapolis-St. Paul territory.

From Minneapolis west you have a 36-hr. railroad trip, and you are still in the territory. It is no wonder then that Twin Cities automobile distributors cannot drive their cars overland even from the Twin Cities to their far-away dealers. Pence dealers drive approximately one-

third of their cars from Minneapolis, but the distant ones in the Dakotas and Montana cannot.

Thinking automotively, the Twin Cities territory, while holding large possibilities for automobiles, offers the greatest market in farm tractors and motor trucks, as well as house lighting outfits and other applications of the internal-combustion engine. There were thirty-two different farm applications for the explosion engine exhibited at the show.

With 150,000 farmers in Minnesota alone, and with the average crop value per farm in 1917 of \$2,868, there is no question as to the possible tractor market that remains to be developed, and it is not surprising that Minneapolis tractor builders consider the city a good center for manufacture.

The average farm size is 177 acres, which is well suited for the three-plow tractor as made to-day. In the Dakotas and Montana, average farm sizes are much greater, permitting the use of the largest type of tractor, those pulling as high as ten or twelve plows.

Crop conditions in all four of the Northwest States represent a higher money value than in any previous year; in fact, the crop valuation in the four States is nearly 60 per cent above that of 1916. The government figures place the crop valuation at \$1,019,272,000, a new record. Some meaning is read into these figures when they are compared with past seasons. The 1916 crop valuation was but \$649,297,000, and other crop valuations are:

Northwest Crop Valuations

1917	\$1,019,272,000
1916	649,297,000
1915	618,456,000
1914	479,055,000
1913	435,082,000
1912	455,722,000

The following government figures of farm crops for 1917, and farm values in the four States of Minnesota, North Dakota, South Dakota and Montana, have special significance to all makers of automotive apparatus:

Four States	Quantity	Farm value
Wheat	183,952,000	\$365,545,000
Corn	193,562,000	225,369,000
Oats	236,925,000	150,646,000
Barley	88,700,000	95,332,000
Rye	23,179,000	37,738,000
Flaxseed	7,990,000	23,798,000
Potatoes	50,085,000	49,122,000
*Hay	5,557,000	71,722,000

*Tons.

\$1,019,272,000

One immense section of the Twin Cities show was given over to industrial exhibits such as farm implements, farm lighting systems and nearly every piece of equipment which the farmer normally uses



Value of Products of States in the Twin Cities Territory

Minnesota			South Dakota				
	Production	Farm price	Farm value		Production	Farm price	Farm value
Winter wheat	1,440,000	\$2.02	\$2,909,000	Winter wheat	1,680,000	\$1.96	\$3,293,000
Spring wheat	56,525,000	2.02	114,180,000	Spring wheat	50,344,000	1.96	98,674,000
Corn	90,000,000	1.10	99,000,000	Corn	97,150,000	1.20	116,580,000
Oats	120,250,000	.63	75,758,000	Oats	64,450,000	.61	39,924,000
Barley	37,800,000	1.11	41,958,000	Barley	26,738,000	1.10	29,172,000
Rye	7,585,000	1.67	12,667,000	Rye	5,600,000	1.55	8,680,000
Flaxseed	1,980,000	2.95	5,841,000	Flaxseed	980,000	2.99	2,930,000
Potatoes	33,600,000	.91	30,576,000	Potatoes	7,200,000	1.11	7,992,000
*Hay	2,868,000	12.10	34,703,000	*Hay	1,162,000	10.60	11,681,000
Total			\$417,592,000	Total			\$318,926,000

North Dakota			Montana				
Spring wheat	56,000,000	\$2.00	\$112,000,000	Winter wheat	7,865,000	\$1.92	\$15,101,000
Corn	5,310,000	1.51	8,018,000	Spring wheat	10,098,000	1.92	19,388,000
Oats	38,625,000	.62	23,948,000	Corn	1,102,000	1.75	1,771,000
Barley	22,812,000	1.00	22,812,000	Oats	13,600,000	.81	11,016,000
Rye	9,880,000	1.64	16,203,000	Barley	1,350,000	1.03	1,390,000
Flaxseed	3,764,000	3.00	11,292,000	Rye	114,000	1.65	188,000
Potatoes	3,870,000	1.30	5,031,000	Flaxseed	1,266,000	2.95	3,735,000
*Hay	484,000	11.50	5,566,000	Potatoes	5,415,000	1.02	5,523,000
Total			\$204,870,000	Total			\$77,884,000

*Tons				*Tons			
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*Tons

*Tons

Standardization in Great Britain

STANDARDIZATION was the main topic at the recent fourth meeting of the Technical Committee of the Motor Industries in London. Recommendations were submitted for the consideration of the Engineering Standards Committee in regard to bolt type detachable wheels for pneumatic tires, tire sizes, loads and inflation pressures, road springs and chassis dimensions for carriage work. Three sub-committees were appointed to consider and report upon: (1) Fuel for internal-combustion engines; (2) the formation of an education committee; (3) the proposed laboratory for internal-combustion engine research. These are solely internal committees, and are not put forward in any

way with a view to overlapping the work which is being carried out by other committees in the same direction. The standardization of automobile parts has now been under consideration by the Engineering Standards Committee for some considerable time, and the result of the work of the numerous sub-committees is beginning to bear fruit. The following reports have already been issued by that body, and may be obtained from the Engineering Standards Committee, 28 Victoria Street, S. W. 1: No. 71, Report on British Standard Dimensions of Wheel Rims and Tire Bands for Solid Rubber Tires; No. 80, Report on British Standard Dimensions of Magnets; No. 45, Report on Dimensions for Spark Plugs.

Fundamentals of Tractor Design*

Size of Tractor, Horsepower and Drawbar Pull—Existing Tractors Analyzed as to Weight and Piston Displacement—Probable Future Development—A Liberty Tractor Design Suggested

By George T. Strite

THE first question to be settled in the design of a tractor is that relating to the size of the machine, the number of plows it will pull or the drawbar pull it will develop. This has been a very hard question to settle. For many years the tendency has been to keep increasing or trying to do just a little more, no matter what size you started with. Even in the days of the big tractor, of 8 and 10 plows capacity, the pressure exerted by customers calling for just a little more power was hard to resist, and the temptation was continually before us to build something larger, although even then most of us knew that the time would come when the small tractor would have its day.

Since the complete readjustment of the tractor manufacturing business, when most companies started with the two and three-plow machine, there has been a constant demand for just a little more pulling capacity. One of the hardest things in the tractor business is to have the nerve to stand pat and build one size and not keep constantly increasing the size so that it will do a little more work.

Power and Traction Required

The next step after the size has been determined is to deal with two related factors, the amount of power and the traction. Here again is a hard question to decide: Whether or not to provide sufficient power so that the motor will not stall but will turn the wheels regardless of the kind of ground or footing you have. If you put in 5 or 10 hp. more than required for ordinary work, then the entire transmission and tractor must have sufficient strength to take care of the additional load and turn the wheels under extreme conditions. Would we think of buying an automobile to-day with power enough (and transmission enough) so that we could spin the wheels on high gear and dry ground? This would be absurd.

However, from a sales point of view, there is one reason why we have done this in tractors. In demonstrating the tractor it is generally loaded to the limit, and if we kill the motor it is a hard knock against that tractor, while if there is sufficient power to keep on turning the wheels, even to the extent of burying the tractor in the ground, this brings out applause and the farmers will say: "Gee, but that tractor has got the power."

Personally, I am inclined to think that we have carried this to extremes. What the average wheel tractor needs is more traction in proportion to the amount of power. The farmer would then get a more efficient machine, and a better balanced one, a machine that could be used under extreme conditions, on wet soft ground or sandy ground. I am inclined to think that as soon as the farmer is educated on this point we will all begin to build tractors better balanced for average efficiency, and not build tractors that will do certain stunts, regardless of the average work the tractor will be expected to do. In other words, both the farmer and manufacturer will use more horse sense and keep an eye on average efficiency.

Weight and Ground Surface

When we have settled between power and traction the third item to consider is ground contact surface and weight of the tractor. In the old days we built tractors which were exceedingly long in weight and rather shy in supporting surface. The tractor of to-day is being built with less weight, this having been made possible by the use of multiple cylinder

motors, high grade materials and more surface on the ground. The surface must also be backed up by the proper shape and style of grounders or lugs.

After the total weight of the tractor is determined, there arises the question of the proper distribution of this weight. If it is a four wheel machine with two drivers in the rear and two front wheels, then careful judgment must be used as to how much weight to place on the drive wheels and how much on the front wheels. The best practice to-day seems to be about 70 per cent of the total weight on the rear drive wheels and 30 per cent on the front wheels when the tractor is not exerting any drawbar pull. This means that when the tractor is pulling a reasonably heavy load, there will be 85 per cent to 90 per cent of the total weight of the tractor, plus a certain percentage of the drawbar pull, on the rear wheels. This last mentioned item depends upon the height of the drawbar hitch on the tractor, the height of the hitch on the plow and the load being pulled. This leaves from 10 per cent to 15 per cent on the front wheels, which for all practical purposes is enough to steer the tractor. However, in going up a steep grade the front wheels are apt to rise and make it hard to steer the tractor.

The motor horsepower for the tractor depends first upon the drawbar pull, which, however, does not mean anything unless the speed is taken into consideration. It takes practically the same power to pull two plows at 3 m.p.h. as it does to pull three plows 2 m.p.h. This is a point in regard to which the farmer has been greatly deceived. Some companies have sold their tractors on drawbar pull in pounds, saying nothing about the miles per hour, while other companies made a strong point of the miles per hour. Both factors together determine the drawbar horsepower.

Power Based on Total Displacement

In connection with the speed and drawbar pull the type of motor and the weight of the tractor must be taken into consideration. From an engineering standpoint—and I think, eventually for the convenience of the farmer—the power should be rated in the specification books on the basis of total displacement. In the following figures I am not going to take into consideration the speed of the different tractors in miles per hour. There is very little difference in the speed of the three machines in group A. In group B there is also surprisingly little difference in speed, in practical farm work, although there is a difference between groups A, B and C, as the small tractors will average from 10 per cent to 15 per cent higher in speed. However, for the sake of comparison, we will disregard the miles per hour in the table.

Out of ninety-five different models in the tractor specifications books, I have taken ten tractors which are among the most noted. The makers of all of them have 500 or more tractors actually in the field. The first three in group A are the large type, two two cylinder and one four cylinder. The next group, B, are the four cylinder 3 and 4 plow tractors of late models and light weight. In group C we have three of the two-cylinder 3 and 4 plow tractors of recent design, but possibly not the latest design. For comparison I wish to take up—

First, the cubic inches of piston displacement per minute for each 14-in. plow pull.

Second, the cubic inches of piston displacement for each 100 lb. rated drawbar pull.

Third, the cubic inches of displacement for each rated drawbar horsepower.

*Read at the S. A. E. tractor meeting held at Chicago on Feb. 1.

SELECTED TRACTOR DATA

	Draw-bar Brake, H.P.	Draw-bar Pull, Lb.	No. of Plows	No. of Cylinders	Cylinder Dimen- sions, In.		Cubic Inches Piston Displacement					Piston Travel per Minute in Ft.	Pounds Weight			
					Bore— Stroke	Engine, R.P.M.	Per Rev.	Total per Minute	Per Plow	Per 100 Lb. Drawbar Pull	Per Drawbar H.P.		Of Tractor	Per Plow	Per Draw- bar, H.P.	Per 100 Lb. Drawbar Pull
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A-1.....	38-60	6,000	8	2	10x15	500	2,356	1,178,000	147,250	19,633	31,000	1,250	20,100	2,512	529	335
A-2.....	30-60	6,000	8	4	6½x8	650	1,061	689,650	86,206	11,494	22,988	866	19,500	2,437	650	325
A-3.....	30-60	5,600	8	2	10x12	375	1,884	706,500	88,312	12,616	23,550	750	26,000	3,250	866	464
Averages..		5,866							107,256	14,581	25,846	955	21,866	2,733	681	374
B-1.....	12-20	2,250	3	4	4½x5	800	318	254,400	84,800	11,563	21,200	666	6,500	2,166	542	295
B-2.....	18-36	3,300	3	4	4½x6¾	850	429	364,650	91,162	11,050	20,258	956	5,900	1,475	327	178
B-3.....	12-25	2,500	3	4	4¼x5½	900	312	280,800	93,600	11,232	33,400	825	5,200	1,733	433	208
B-4.....	15-30	2,600	3	4	4¼x5¾	900	322	289,800	96,600	11,146	19,320	862	3,000	1,000	200	115
Averages..		2,661							11,540	11,247	23,544	827	5,150	1,593	375	199
C-1.....	12-24	2,200	3	2	6x7	750	395	296,250	98,750	13,465	24,687	875	5,000	1,666	416	227
C-2.....	12-24	2,000	3	2	5½x7	750	332	249,000	83,000	12,450	20,750	875	5,000	1,666	416	250
C-3.....	12-25	2,500	3	2	6¼x7	570	464	264,480	75,565	10,579	22,040	665	7,400	2,114	616	296
Averages..		2,233							85,771	12,164	22,728	802	5,800	1,815	482	257

Fourth, weight of tractor for each 14-in. plow pulled.

Fifth, weight of tractor for each 100 lb. drawbar pull.

Sixth, weight of tractor for each rated drawbar horsepower.

You will note in column nine, tractor No. A-1 has a piston displacement of 147,250 cu. in. per minute for each 14-in. plow pulled.

Tractor No. A-2 has a piston displacement of 86,206 cu. in. per minute for each plow pulled.

Tractor No. A-3 has a piston displacement of 88,312 cu. in. per minute for each plow pulled.

In column nine, the average piston displacement per minute per plow, of the three tractors in group A is 107,256.

The average piston displacement per minute per plow of the four tractors in group B is 91,450, or 15,000 cu. in. less than group A.

The average piston displacement per minute per plow of the three tractors in group C is 85,771, or 21,000 cu. in. less than group A. You will notice that the two-cylinder tractors in group C have less displacement per minute than group B, the four-cylinder machines of the same size, or less power per plow.

In column ten we have in group A the average piston displacement per minute per 100 lb. pull on the drawbar, 14,581 cu. in.

In group B the average piston displacement per minute per 100 lb. rated drawbar pull is 11,247 cu. in., or about 3300 cu. in. less than in group A.

In group C the average piston displacement per minute per 100 lb. rated drawbar pull is 12,164 cu. in. You will notice that in this case there are 900 cu. in. displacement more than in group B and 2400 cu. in. less than in group A per 100 lb. rated drawbar pull.

In column eleven we have in group A the average piston displacement per minute for each rated drawbar horsepower, 25,846 cu. in.

In group B, the average piston displacement per minute for each rated drawbar horsepower is 23,544 cu. in.

We have in group C for the average piston displacement per minute for each rated drawbar horsepower, 22,728 cu. in. You will notice that group B, the four-cylinder machines, have 700 cu. in. more displacement than group C.

In column thirteen we begin the relative weights of the three different groups of tractors. You will notice the average weight of the three large tractors in group A is 21,866 lb. The average weight of the four-cylinder tractors in group B is 5160 lb. and the average weight of group C, the two-cylinder tractors, is 5800 lb. or 650 lb. more per tractor than the four-cylinder machines, while the average drawbar pull of group B tractors is 429 lb. more than that of the group C two-cylinder machines.

In column fourteen we have the weight for each 14-in. plow pulled. You will notice the average weight of the large tractor in group A is 2733 lb. for each 14-in. plow pulled.

The average weight of the tractors in group B, which are four-cylinder, three and four plow machines, is 1593 lb., or nearly 250 lb. less for each 14-in. plow pulled than the weight of group A machines.

The average weight of the group C two-cylinder tractors is 1815 lb. for each 14-in. plow pulled, or nearly 250 lb. more than the average four-cylinder machine and about 1100 lb. per plow less than group A.

In column fifteen we come to the weight of tractor for each rated drawbar horsepower. In the large tractor we find this to be 681 lb. In group B, the four-cylinder tractors, we find an average weight of 374 lb. for each rated drawbar horsepower. In group C we find a tractor weight in the two-cylinder tractor of 482 lb. for each drawbar horsepower, or 108 lb. more than in group B and 200 lb. less than in group A.

In column sixteen we have the weight for each 100 lb. of rated drawbar pull. In group A you will notice this to be 374 lb. In the group B four-cylinder tractors the average is 199 lb. or 75 lb. less than in group A, and in group C it is 258 lb. more than in group B and 117 lb. less than in group A.

It is interesting to note in this connection that the highest piston speed in feet per minute is in group A and the highest crankshaft speeds are in groups B and C.

Both Types Show Development

Both the four-cylinder and two-cylinder late type tractors show a wonderful development, especially so in regard to the weight per plow and per horsepower. There is every reason why the large tractor should weigh less for each plow and for each 100 lb. of drawbar pull than the small tractor. This is due to the initial weight of the tractor, which in a one or two plow tractor is very high. The more plows we have to distribute the initial weight over, the less the weight for each plow.

For instance, it takes an initial weight of 1500 to 2000 lb. to pull one 14-in. plow; 500 to 1000 lb. more to pull two plows and 300 to 700 lb. more to pull the third plow. The displacement is affected in the same way, as it takes a certain displacement for the machine itself.

You will note that there is some variation in these averages. I think these are caused by some tractors being over-rated in drawbar horsepower and drawbar pull, while others are very conservatively rated. As a rule, the four-cylinder machine shows a higher state of development than the two-cylinder machine. You will notice that in one case the rated drawbar pull is almost equal to the entire weight.

There is a question as to how far we can go in reducing the

weight per 100 lb. for practical everyday use under average conditions of soil. I can see how we can eventually build tractors so that they will pull more than their weight, providing the speed is not too high, and that they are, as it were, geared to the ground, or used in certain sections where this is possible, I do not think it is possible under average conditions. However, our friend W. N. Smith will probably tell us later on that this can be done by the use of the "Never Slip" or "Caterpillar type." I admit that there is a big field in certain sections and for certain uses for the machine that Mr. Smith will tell us about, but the wheeled machine is going to be the popular machine and the big seller for average agricultural purposes.

Tractor engineers have been severely criticized in some cases for the past and present state of the tractor, with its various different designs. However, it is only through the development of different types and different designs that the law of the survival of the fittest can assert itself.

From now on the tractor industry is going to advance either by the survival of the fittest and the natural evolution of the right tractors succeeding and the wrong gradually dying out or getting in the right track, or, the tractor engineers and manufacturers getting together and through standardization avoid a lot of wrecks and failures which must come some time.

The tractor manufacturers of to-day have the greatest opportunity that any manufacturing industry has ever had in the history of the world. They have an opportunity of carrying standardization farther, if they will get together, work together, and, through the Society of Automotive Engineers, assist in putting through the standards which are necessary, and not try to hold back.

It has been said that eastern automobile manufacturers are going to try to get into the tractor manufacturing business. They are going to get in, and personally I believe that the sooner they get in the better, although they will probably spend fortunes to learn just what many of us have learned, but the automobile manufacturer has four advantages over the tractor manufacturer:

- 1—He has the money and is looked up to by the investor as a successful business man.
- 2—He knows how to get production, and he has the organization and equipment to get production.
- 3—By past experience in the automobile industry he knows the value of standardization, and will help standardize the parts of tractors.
- 4—He has learned to cut out petty jealousies and petty ideas, and to look at average results. One of the greatest troubles in the tractor business to-day is the prevalence of jealousy, of the craze to "beat" the other fellow, and of petty

ideas. Some tractor men stick to these ideas until their company is bankrupt.

The tractor business is an important business. It is going to be one of the greatest in volume of all businesses. The tractor has a greater bearing on the food problem and the general happiness and welfare of mankind than any other machine ever brought out. It is going to entirely revolutionize farming in all parts of the world. It will lead to the adoption of better methods of tillage which are going to mean more food for the world at far less cost.

Considering the state of the tractor industry at this time, the inability of the companies to produce tractors fast enough and the quality of tractors that are being turned out, I believe that a Liberty tractor should be designed to be manufactured by the Government during the war. Any company should be free to manufacture this tractor as a whole or to use any feature thereof it might see fit, after the war. The corps of engineers appointed to design and build this machine should be given instructions not to do any experimenting, but to work on the lines of the best we have in the tractor as it is to-day.

This move would do more to bring about standardization and development of the tractor than any other move that could possibly be made. It would result in the greatest good to all and especially to the tractor manufacturer. The war has emphasized the need and advantages of standardization in other machines. Why should not the same apply to the tractor?

Standardization has been greatly misunderstood. It does not mean that the different tractors will lose their individual characteristics; it does not mean a standard tractor. It does mean standard dimensions for certain parts and cutting out odd sizes, which will cut out unnecessary time and expense in the engineering department. It will reduce cost of parts by reducing multiplicity of parts. It will mean quicker and better service to users. Standard dimensions as, for instance, a drawbar height of 17 in. and a standard speed of 2 1/3 m.p.h., will do away with confusion, misunderstanding and unnecessary expense.

Standard units or parts mean that parts of different makes will fit in the same place, with the same bolt, interchangeably. It means that any magneto, carburetor or clutch can be used on the same motor of the same size. It means that a Waukesha, Buda or Erd motor of the same size can be used without change. It will eventually mean that a Foote, Nuttall or any other standard transmission will fit the tractor without change, of even a bolt hole. Many different tractors have the Waukesha motor. Do they look alike? Doesn't each have its own individuality?

Rayfield Thermostat Control Involves New Principle

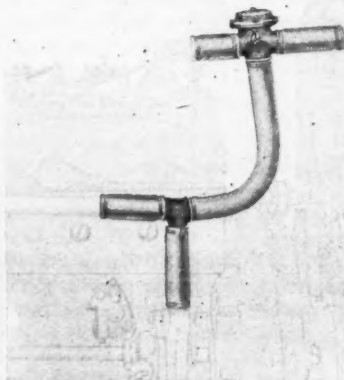
HERETOFORE thermostatic valves in cooling circuits simply obturated the circuit at one point when the temperature of the water dropped below a certain point, thus preventing all circulation through both the engine jackets

and the radiator. There is a clearly defined object in shutting off circulation through the jackets—namely, to maintain the cylinder walls at a relatively high temperature. This object is not furthered, however, by preventing circulation through the radiator, as with the jackets shut off from the radiator no heat can be transferred from the former to the latter.

Charles Rayfield, engineer of the Findeisen & Kropf Mfg. Co., Chicago, has developed a circulation control system embodying two butterfly valves linked together, in connection with an expansion coil which opens the upper valve and closes the lower one when the circulating water reaches a temperature of 170 deg. Fahr., thus permitting circulation through the radiator, whereas if the engine is cold the upper valve is closed and the lower one open, water circulating through the radiator and pump only. Thus the water in the cylinder block is gradually displaced until all of the water in the system is raised to the predetermined temperature, which in this case is 170 deg. Fahr.



Rayfield thermostat



Method of installation

Fiat Tractor for Hauling Field Guns

**Weights Eight Tons and Is Capable of Hauling 25 Tons
Up a 15 Per Cent Grade—Chain Drive to Rear Wheels**

A VEHICLE designed to haul guns naturally must differ considerably in design from a touring car or truck. Not only must it be capable of hauling heavy loads, but it must possess the ability to travel over any kind of country and get itself and its trailers out of every kind of difficulty. The three main types of artillery tractors are four-wheel drivers—in which power is delivered to the front as well as to the rear wheels; the caterpillar or track laying tractor; and the rear wheel driver with special driving wheels.

The most extensively employed of the latter is the Fiat 70 hp. tractor, used throughout the Italian artillery service, and also by the French. This tractor, which weighs nearly 8 tons empty and carries a load of $3\frac{1}{2}$ tons on its platform, is capable of hauling 100 tons on good level roads and can climb gradients of 15 per cent with 25 tons in tow. Its road speed varies from 1 to 8 m.p.h. It is claimed to be able to handle the largest guns used in the field, and to have taken big guns into mountain positions altogether inaccessible to horse teams.

Chain Drive Inclosed

On the Fiat tractor the power is transmitted to the rear wheels through inclosed side chains, the housings of which not only act as radius rods but are sufficiently heavy to carry the weight of the vehicle if the wheels embed. Front wheels are cast steel shod with rubber tires, while at the rear there are big diameter steel wheels of a patented type designed to receive around their circumference an endless steel band. When not in use on the wheel these bands are carried on platforms which form mud-guards alongside the body. Being heavy, they are hauled into this position or lowered to

the ground by means of a hand winch. These bands, which are only put on when roads are in very bad condition, or when the tractor has to operate away from made roads, increase the supporting surface and also increase the adherence.

The tractor is fitted at the rear with a powerful winding drum having 60 yd. of 15 mm. steel cable. This drum is made use of when the tractor cannot get its trailers or its gun up a hill by direct haulage. Then it climbs alone, unwinds its cable and hauls its load up slowly.

The engine has four cylinders of $5\frac{1}{8}$ in. bore by $8\frac{1}{8}$ in. stroke, with a normal speed of 1000 r.p.m. Four speeds and reverse are afforded by the transmission. A differential lock and very powerful water-cooled brakes are other features. There is a special device whereby the hand brake can lock either wheel, as desired, thereby facilitating getting round corners on steep mountain roads.

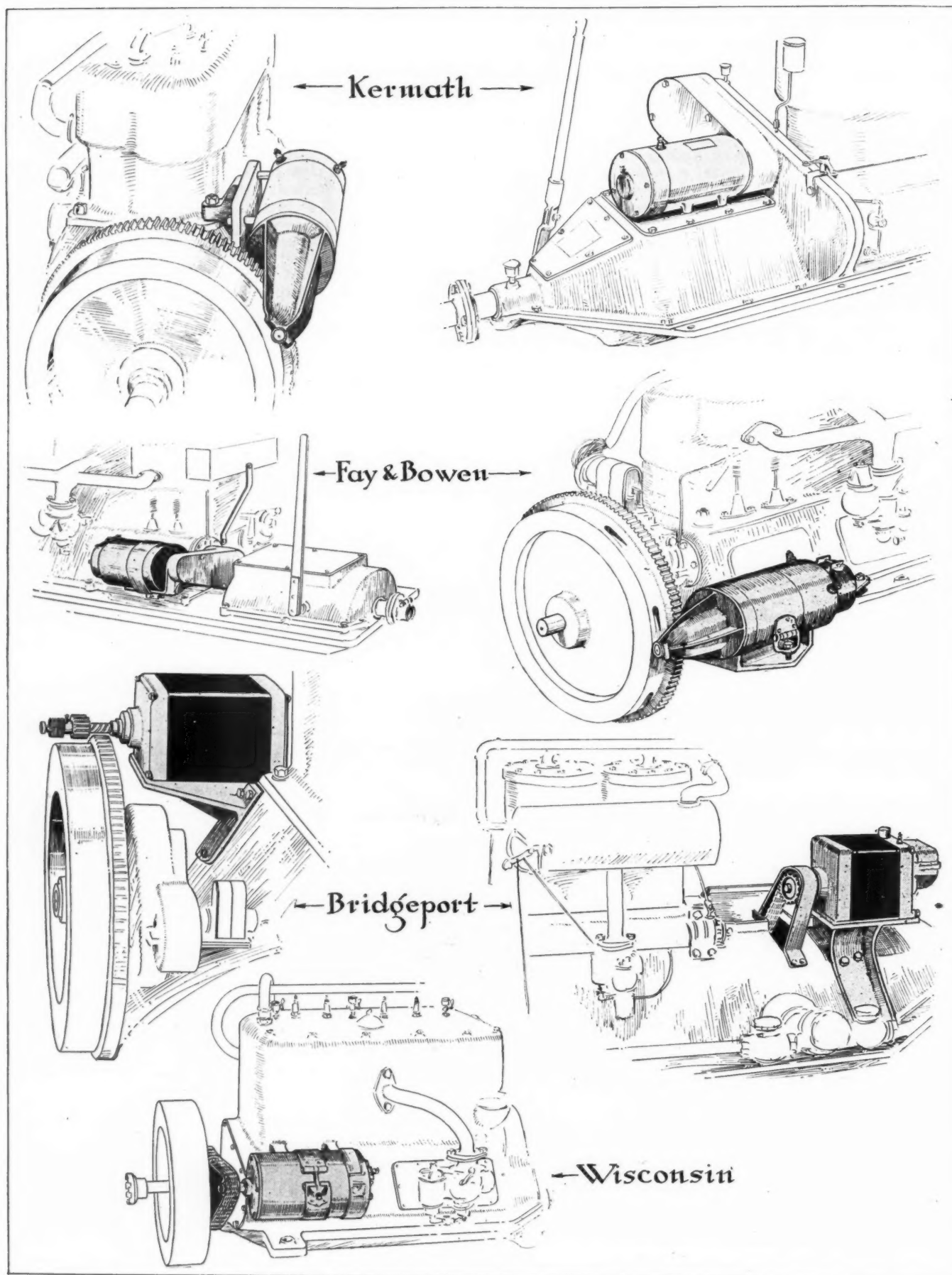
The Fiat tractor is at present employed exclusively in war service. The results obtained in the haulage of artillery in the Alps have induced the makers to believe that it will be used extensively after the war in peaceful occupations, particularly in the colonies and new countries.

A SURVEY of aircraft traffic plans in Sweden was made at a recent meeting of the Aeronautical Society in Stockholm by Capt. Dahlbeck, the meeting being attended by the crown prince, the premier and members of the cabinet. Denmark has no air traffic society yet, but a large new factory for airplanes is in full swing. Denmark is interested in comprehensive international schemes, such as England-Denmark-Sweden and Germany-Sweden-Norway, that is as an intermediate link.

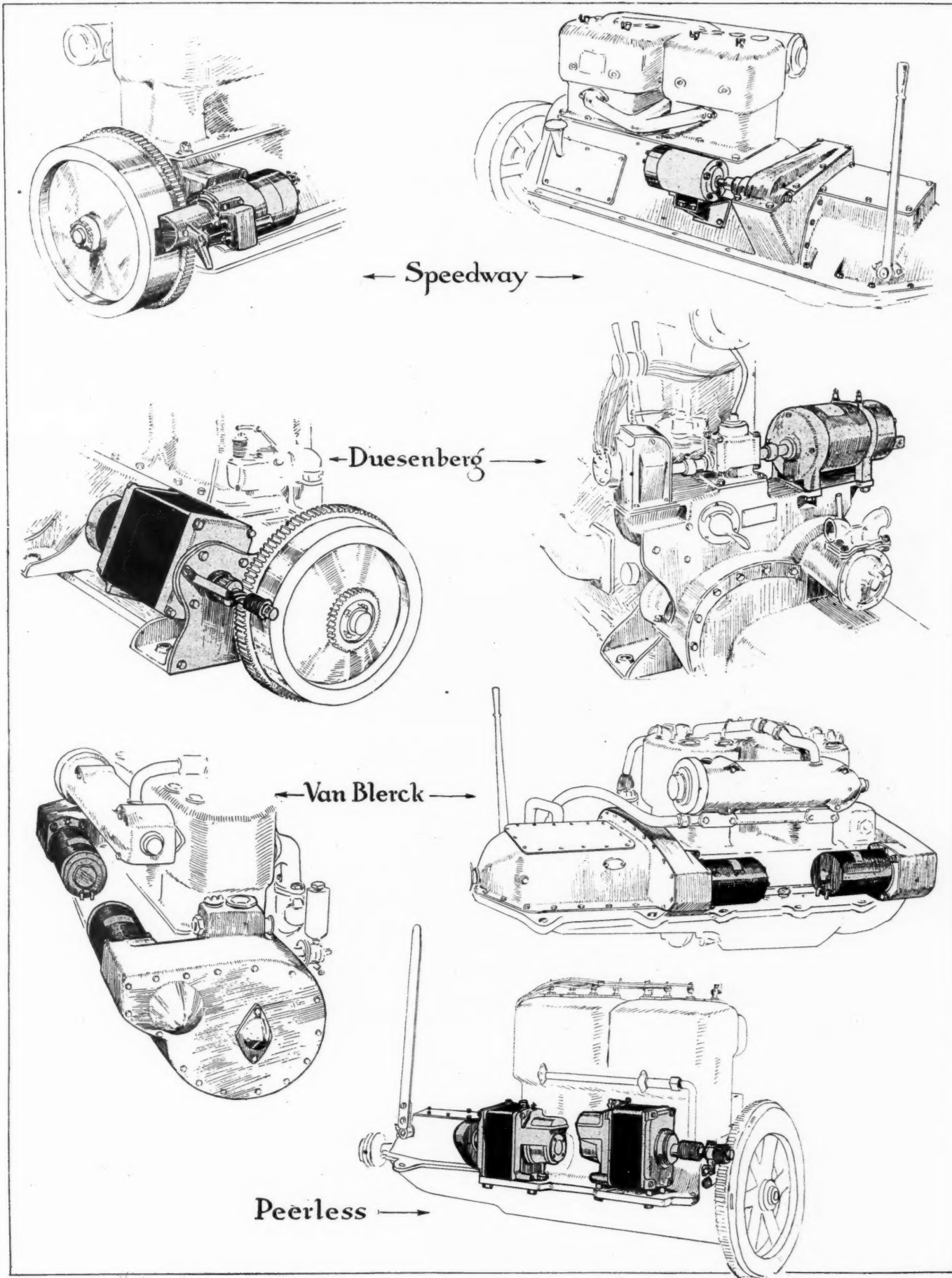


Fiat heavy road tractor for moving artillery and supplies

Starter and Generator Mountings on



Motor Boat Engines at the Recent Show



The Twin City "16" Oil Tractor

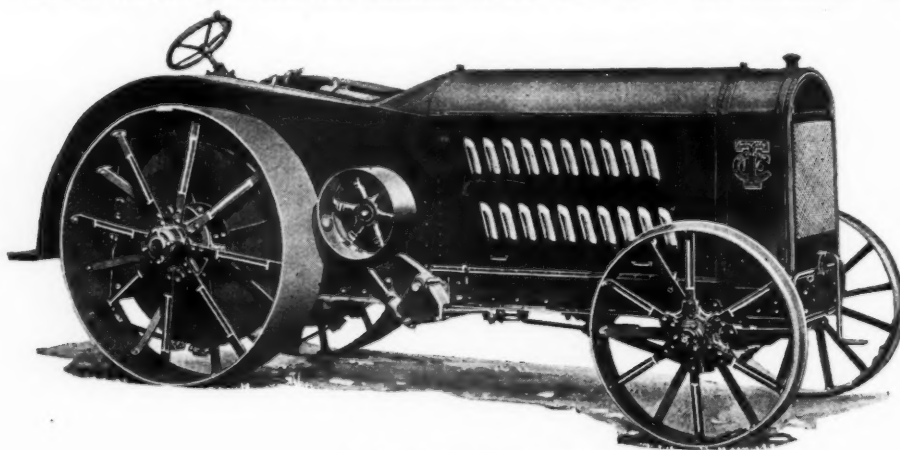
Built on Automobile Lines—Total Enclosure of All Working Parts, Extensive Use of Anti-Friction Bearings, Spring Suspension in Front and Rear, and Smooth Exterior Lines Its Chief Characteristics

By P. M. Heldt

MINNEAPOLIS has long been a center of the farm tractor industry, and among the leading concerns in the business in the Flour City is the Minneapolis Steel & Machinery Co., which turns out the Twin City line of tractors, comprising four different models. The line ranges from the moderate sized "16-30" to the huge "60-90" and covers every requirement of farm work. Three of the four models are fitted with four-cylinder engines, while the largest has a six cylinder one. The cylinder dimensions and piston displacements are as follows:

16-30	25-45	40-65	60-90
5 x 7½ in.	6¼ x 8 in.	7¼ x 9 in.	7¼ x 9 in.
589 cu. in.	982 cu. in.	1486 cu. in.	2229 cu. in.

In the following article the smallest model, the "16,"



Twin City "16" tractor

is specially dealt with. The latter is equipped with an engine of thoroughly modern design. Its four cylinders are cast in a block and the cylinder heads are detachable. The jacket space tapers slightly from the top to the bottom, so that the greatest amount of water is carried where the greatest cooling effect is needed. It will be noticed from the sectional view herewith that the water space is especially liberal around the head. The spark plug is so located as to insure effective cooling—a point of considerable importance where kerosene is the fuel used. A somewhat unusual feature is the high bosses for the cylinder head retaining bolts. Their object is apparent, however, for it will be seen that the faces of these bosses are in a plane with the faces of a number of other bosses on the head, so that all can be milled off in one operation. In order to obviate condensation of the fuel in the intake manifold, the latter is cast integral with the cylinder block, and there is only a single joint be-

tween the inlet pipe and the engine. The exhaust manifold is outside the cylinder casting and is of special design.

The pistons are comparatively long and are provided with three compression rings at the upper end. Over the piston pin, the piston is deeply relieved, making it of what has come to be known as the hour-glass type. Adjacent to the piston pin ends the relief extends considerably farther up and down the pistons. A hollow, hardened piston pin is used. It has its bearing in the connecting-rod, being secured in the piston bosses by means of a key and set screw. The connecting-rods are drop forgings of the usual I section.

The small pinion on the crankshaft meshes with a large idler gear and the latter in turn meshes with the gear on the camshaft. Also meshing with the idler gear is a

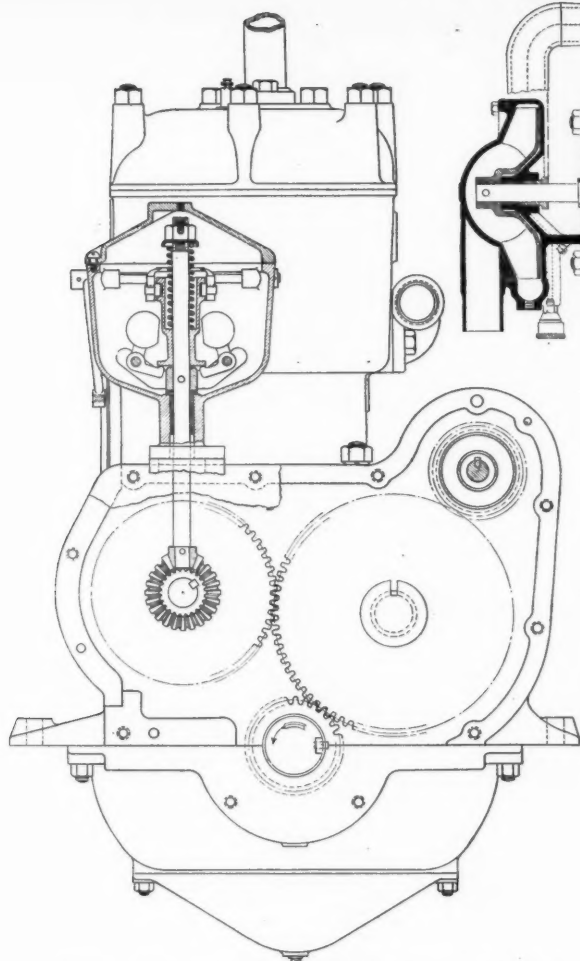
small gear for driving the water pump and the magneto shaft, both of which latter devices run at crankshaft speed. The crankshaft pinion is of forged steel. In fact, all of the gears of the camshaft drive are of steel and the idler gear is hardened. From the forward end of the camshaft the governor is driven through bevel pinions. The governor is mounted on a vertical shaft and acts on a forked lever the spindle of which extends through the wall of the governor housing. A lever arm secured to the spindle outside the housing connects to a butterfly valve in the inlet pipe. There is another, hand-controlled butterfly valve in the carbureter. By remov-

ing a plate at the forward end of the engine all of the gears of the camshaft and accessories drive are rendered accessible.

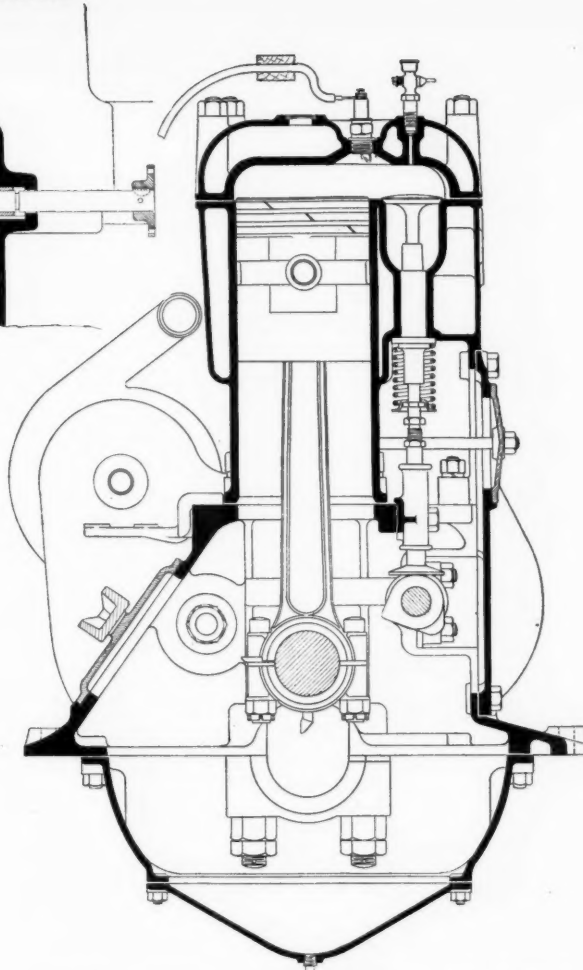
Valves of the usual 45 deg. poppet type are used and are located all on the same side of the cylinder block, which is of the L-head type. There are no caps over the valves, and in order to get at them it is necessary to remove the cylinder head. Valve caps or plugs often are a source of trouble, because of their overheating and causing preignition, and, besides, it is figured that when one valve needs attention it is generally good policy to look them all over and the cylinder head can be taken off as easily as eight valve plugs can be removed.

The push rods or cam followers, which have flat bottom ends, are mounted in guides bolted against the upper part of the crankcase, four guides being in one piece.

The entire side wall of the engine from the lower edge of the valve pockets to near the central flange on the



Front view of engine, showing gearing and governor



Section through engine, indicating accessibility of parts

crankcase is removable, but there are hand holes in this large side plate directly opposite the valve adjusting nuts, and the hand hole covers can be removed in case an adjustment is to be made. On the opposite side of the crankcase there are two large hand holes with cover plates through which the connecting-rod bearings may be adjusted and piston and connecting rods removed if desired. For the adjustment of the camshaft bearings it is necessary to remove the large side plates. The camshaft has its bearings between the side of the crankcase and bearing caps. It can be easily removed. All of the three crankshaft main bearings are supported by the upper part of the crankcase, thus making it possible to remove the lower half of the case without disturbing any other part.

A Kingston $1\frac{3}{4}$ in. carbureter is used, in connection with a special vaporizing manifold. The exhaust manifold is of what may be described as the looped type. A part of the lower branch of the loop is surrounded by the vaporizer. At each end of the upper branch of the exhaust manifold there is a butterfly valve by which means it is possible to let any part or all of the exhaust gases pass through the lower branch, thus increasing or decreasing the heating effects in the vaporizer at will. The vaporizer is in the form of a jacket over the exhaust pipe within which jacket there is a series of baffles compelling the gases to take a zigzag course.

Under ordinary conditions, the Twin City "16" operates on kerosene, its carbureter being fed from a 33 gal. tank. The engine is started on gasoline, however, and a storage capacity of 3 gal. of gasoline is provided. By means of a three-way valve located close to the seat of

the driver, the change from one fuel to the other can be made. The kerosene tank is located under the rear platform or floor and is of sufficient capacity for a day's work. The gasoline tank is cylindrical and is located on the left hand rear wheel guard. From the kerosene tank the fuel is fed to the carbureter by the Stewart vacuum system.

Ignition is effected by a K-W magneto with impulse starter. Timing of the spark is controlled by hand. Lubrication is by means of a Detroit lubricator which is mounted on a bracket at the side of the cylinder block. From this lubricator oil leads run to each of the three main bearings and to each cylinder. The lower part of the crankcase is made in the form of a set of troughs under the connecting-rod heads, and splash lubrication is used in addition to the force feed. Each connecting-rod cap is provided with an oil spoon which dips into the oil in the troughs. The lubricator is driven through a round leather belt from the rear end of the camshaft.

Liberal Cooling System

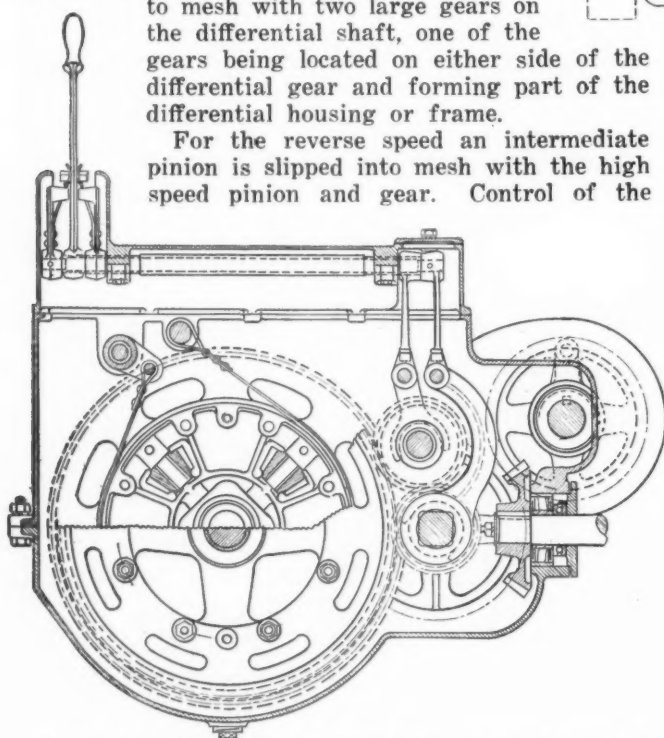
A centrifugal water pump of liberal size is mounted as a unit at the front end of the cam gear case. A horizontal, tubular type of radiator is used, the tubes being of small diameter and placed close together. There is no less than 154 sq. ft. of cooling surface in the radiator and the cooling system has a capacity of 35 gal. A four-bladed fan 24 in. in diameter is mounted on the front cover and is driven by a $2\frac{1}{2}$ -in. flat leather belt off the crankshaft at 1900 r.p.m. There is one water inlet to the engine jacket, at the bottom of same, and a single outlet centrally in the head.

The engine is governed to run at a normal speed of 650 r.p.m. Its weight, including carbureter, magneto, manifold and fan, is 1650 lb.

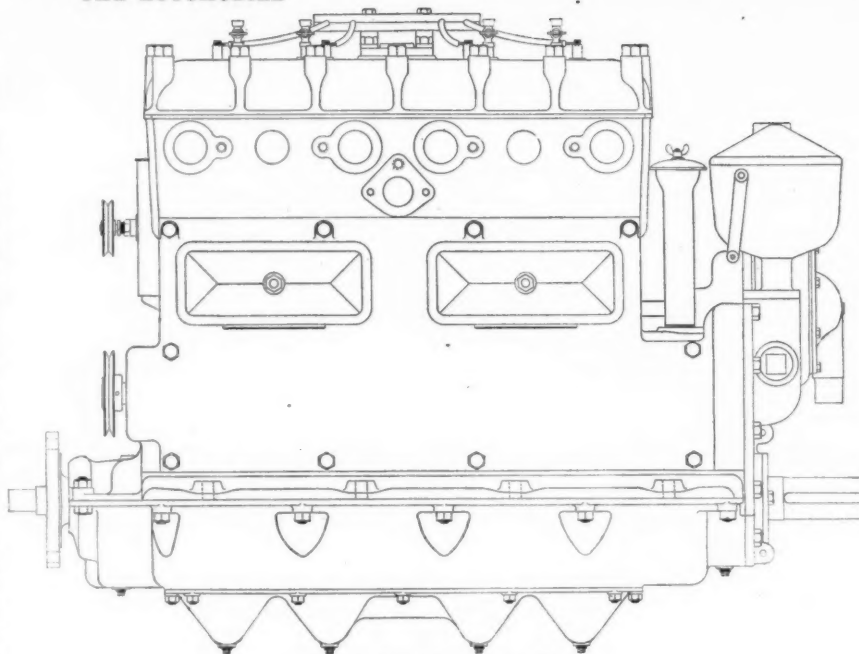
Ease of adjustment is the feature of the clutch, which is of the band type. Adjustment may be effected by taking up on the anchoring screw. The clutch drum is an integral part of the flywheel and the band is lined with friction material. A cup and cone clutch brake is automatically applied upon release of the clutch, thereby facilitating the gear shifting operation. The male member of this clutch brake consists of a block of hardwood. Since the clutch is of the single band type, a counterweight is provided opposite the bracket supporting the clutch lever, to insure balanced running.

A short distance back of the engine is located the gear-box, whose shafts run transversely across the frame. Therefore, the pinion on the shaft entering the gear-box is of the bevel type, and it meshes with a bevel gear on the intermediate shaft of the transmission, effecting a reduction in the ratio of 3 to 2. Directly back of the bevel gear on the intermediate shaft is a spur gear which meshes with another spur gear on a shaft in the forward part of the gearcase. This shaft extends outside the gearbox and carries the belt pulley. Hence belt power is controlled by the same clutch as the motion of the tractor. The pulley is 17 in. in diameter and has a width of face of 8 in.; it runs at 528 r.p.m., giving a belt speed of 2350 ft. p.m. The intermediate shaft is squared over the greater portion of its length and carries a double sliding pinion, one of the pinions serving for the low gear and the other for the high gear. These pinions are adapted to mesh with two large gears on the differential shaft, one of the gears being located on either side of the differential gear and forming part of the differential housing or frame.

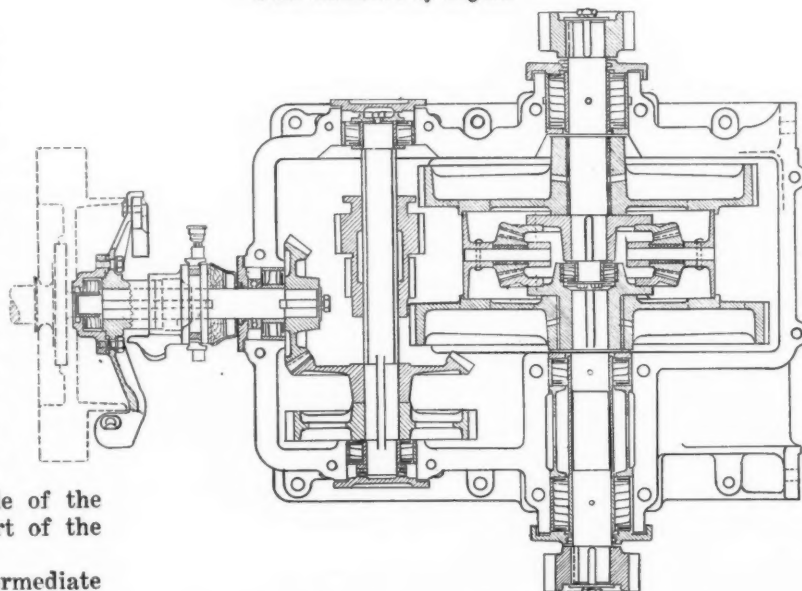
For the reverse speed an intermediate pinion is slipped into mesh with the high speed pinion and gear. Control of the



Vertical section through transmission, showing selective control, differential and brake



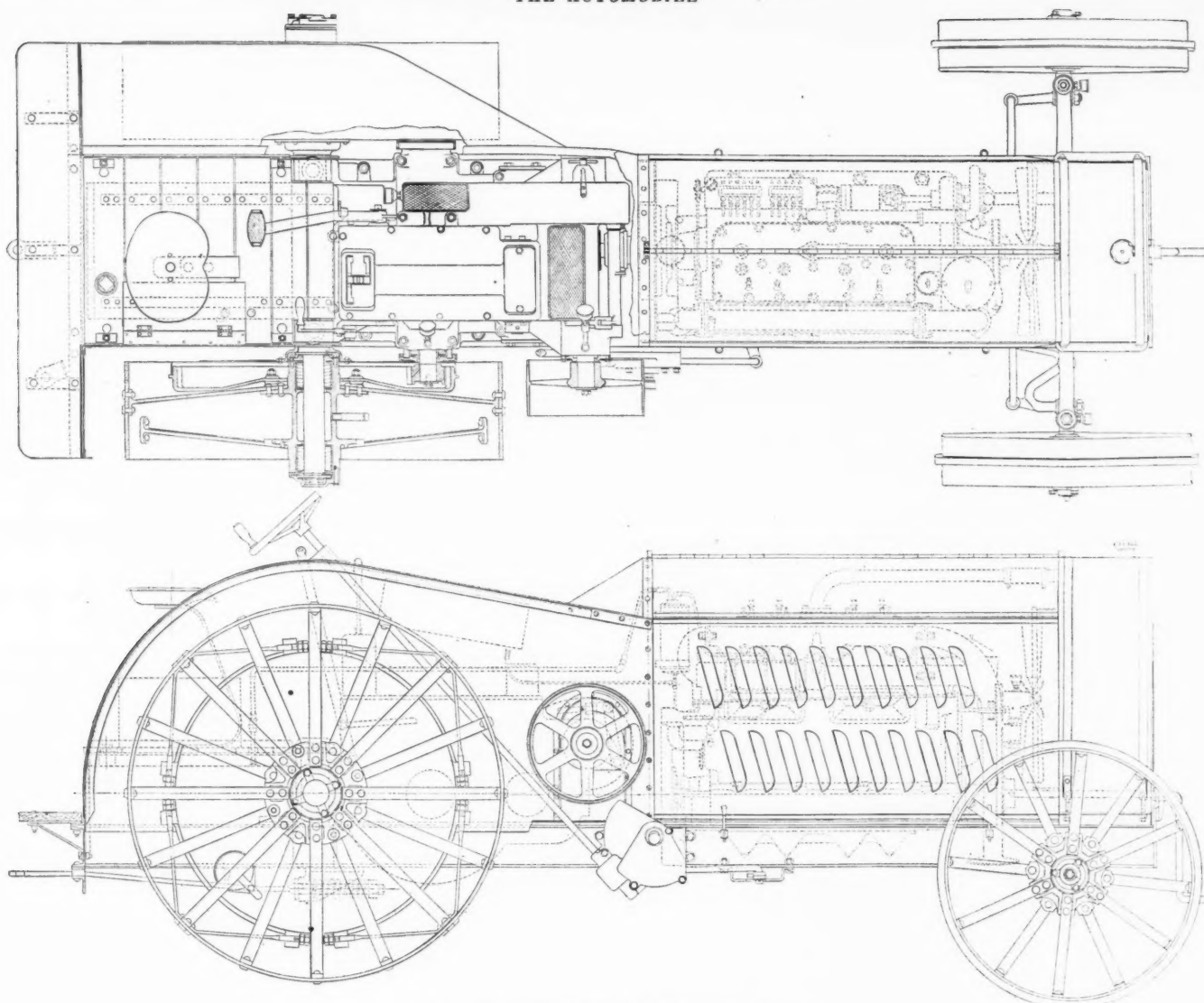
Side elevation of engine



Horizontal section through clutch and transmission

change gear is effected selectively. All shafts of the transmission are of alloy steel, heat-treated and ground and the gears are of special gear steel and cut with stub teeth. All of the shafts are mounted in Hyatt roller bearings. The two forward speeds are 2 and $2\frac{3}{4}$ m.p.h., respectively, and the reverse speed is the same as the higher of the two forward speeds— $2\frac{3}{4}$ m.p.h. The differential is of the bevel pinion type with four pinions and is so designed that all bevel gear thrust is self-contained.

The final drive to the rear wheels is by completely inclosed internal gears. The pinions of this gear are secured to the outer end of the differential shaft. The bull gears are centered on a turned shoulder on the drive wheel hubs, so that they are maintained perfectly concentric to the wheel, which permits of a correct mesh of the gears and pinions and of a silent and efficient drive. The bull gear, however, drives directly to the wheel rim through tension bars, thereby relieving the web of the bull gear and also the drive wheel of all torsional strain. Bull gears and pinions are completely inclosed by a sheet metal guard which telescopes the rim of the gear, making



Plan and elevation of Twin City tractor

a running joint between the gear and the guard. By the use of a special lining all dirt is excluded from the gear and efficient lubrication is made possible. The bull pinions are made of steel forgings and are hardened, and the bull gears are made of semi-steel.

The rear wheels are 54 in. in diameter and have rims 14 in. wide. They are mounted on Hyatt roller bearings on the stationary or dead rear axle. The latter is heat treated and ground, and is mounted in guide bearings which sustain the weight of the tractor through coiled springs. The front axle is of the automobile type, its main portion being of I section. Spring suspension is also provided for the forward end of the frame, the weight being carried on the axle through springs concealed in the frame, beneath the radiator. Hyatt bearings are used also in the front wheels, which are mounted on heat treated and ground steel knuckles. The hubs of all four wheels are provided with large grease chambers, an oil tight cap and end plate insuring perfect lubrication without the need of frequent attention. The front wheels are 36 in. in diameter and have rims 7 in. wide. A brake is placed on the housing of the differential gear. It is of the band type and operated by a pedal.

The frame is made of 6-in. structural steel of heavy section, and is reinforced by plates at both top and bottom flanges. All joints are hot riveted. The steering gear is of the worm and sector type and is inclosed in an oil tight case. A neat hood is provided over the engine

which conforms exactly to the outline of the radiator and joins the wheel guards which are formed to line up nicely with it. It is securely held in place by spring clasps but can be easily and quickly removed.

The draw bar, which is spring cushioned, is located at a height of 15½ in. from the ground. The tractor has a wheelbase of 9 ft. and its total weight is 7800 lb.

New Instrument for Thermal Investigations

IN A PAPER published in a recent number of the *Revue de Metallurgie*, Pierre Chevenard describes a type of differential dilatometer which he has designed for thermal investigations on steels in connection with their heat treatment. He claims that this instrument is highly suitable for use in a steel works laboratory owing to the reliability and simplicity of its design. Only small quantities of metal are required; the instrument is easy to set up, and the readings are not affected by the vibrations which are unavoidable in a steel works laboratory. An instrument of the type referred to has been in use for some time for routine testing in a large steel works in France. It provides a useful complement to the chemical and micrographical examinations of certain steels. Finally, the instrument has proved useful in examining, qualitatively, slight modifications in the dilatibility of metals owing to thermal or mechanical influences.

Fuel Tanks and Other Sheet Metal Parts

Tank Designs Worked Out by Geuder, Paeschke & Frèy in Great Variety—
Strong and Weak Points of Various Forms—Drawn
Steel Oil Pans and Radiator Shells

FORMERLY the fuel tanks of automobiles were made from copper, riveted and soldered. This was a very expensive process because of the large amount of work involved. Copper was the material used, because it presents a clean surface and the solder flows well on it and adheres well. At the present time the commercial material for built-up type gasoline tanks is terne plate, which is sheet steel coated with an alloy composed of approximately 75 per cent of lead and 25 per cent of tin. The stock generally specified varies from No. 18 gauge to No. 22 gauge, the latter being used only where the tank is not exposed to injury. Where it is exposed it is better and quite usual practice to make the body of No. 20 gauge and the heads of No. 18 gauge.

There are numerous constructions of gas tanks, and the writer recently had occasion to discuss the subject with an engineer of Geuder, Paeschke & Frey of Milwaukee, who specialize in tanks of all kinds for use on motor cars, trucks and tractors, as well as in deep-drawn sheet metal stampings.

Forms of Seams Used

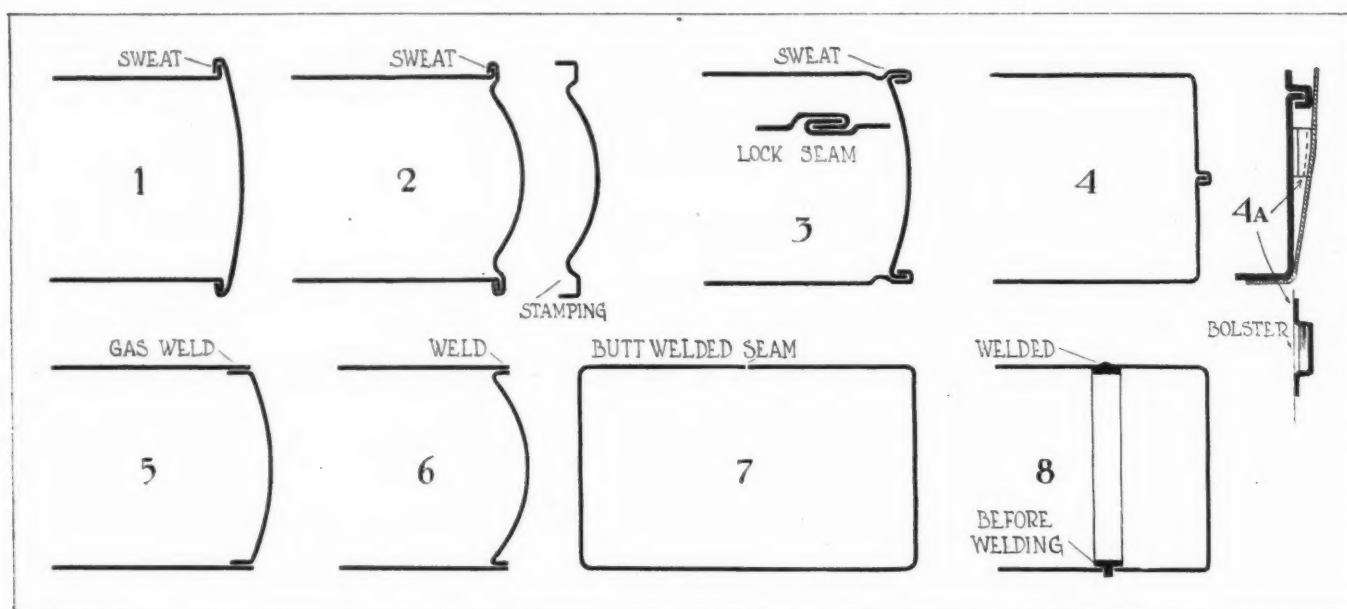
A few of the different types of construction are here described. The construction shown at 1 is unsatisfactory because the body of the tank is not properly supported. It will be noticed that the body is flanged out at the end—this being done in a flanging machine—and the convex head is then spun or beaded over the flange and sweated.

A better construction is that shown at 2. Here the head is pressed in the form shown on the right and is forced onto the end of the tank body. It is obvious that with such a tank there is much less likelihood of distortion from the cylindrical shape. The flange on the head is first spun over and the joint is then sweated as shown.

Another construction, and which is considered the best of all by the G. P. F. engineers, is that shown at 3. Here a small corrugation is rolled in the body sheet near the head to stiffen the body and support the head. The convex head with its outwardly turned flange is forced in, the edge of the body sheet is spun over and the joint sweated. One advantage of this construction is that there is no flange on the outside of the cylinder, so the tank can be put in a very restricted space. Also, the sweated joint is in a protected place. The form of lock seam used on the body of the tank is shown in the small sketch.

Baffle plates are sometimes riveted and soldered but generally only soldered. Of course, it is better to both rivet and solder them, as in that case all chances of their coming loose are eliminated. In the average 14-16-gal. tank, 12 in. in diameter by about 30 in. long, two baffle plates are usually specified.

Recently drawn tanks have come into use. These might be described as consisting of two deep pans joined together at their flanges. One advantage of the drawing process for making tanks is that it permits of irregular shapes as required in cowl tanks of great



Forms of seams and joints used in fuel tanks

strength. The drawn tank costs somewhat more than the ordinary built-up tank, but when a cowl tank is used no vacuum feed system is required and the saving thus effected may be made to more than offset the slight additional cost of this type of tank over one hung at the rear of the car.

Truck and Tractor Tanks

For truck and tractor purposes welded tanks of heavier stock, usually No. 16 gauge, are used. There are also several forms of construction in this line of tanks. The ends may be formed as shown at 5 or as shown at 6. There is probably very little difference between the two constructions as regards their merits, and it is largely a matter of taste—one engineer prefers one type and another the other. In both cases the tank body is supported on a wide circular ring. There are also two methods of making the longitudinal seams of these tanks. They may be either butt-welded, as shown at 7, or lap welded.

Cut 8 illustrates a distinctive Geuder, Paeschke & Frey construction. In this a T sectional piece of rolled material is provided to act as support. The web of the support extends slightly above the outside surface at first, but after being fused down, at the same time welding the body, head and reinforcement solidly together, it has practically disappeared.

Materials for Tanks

Tanks are furnished either in the black, galvanized or in terne coat. Baffle plates are usually omitted in truck tanks, on account of the low speed, the heavier stock used and the more rigid supports.

Designers of automobiles should realize the necessity of properly supporting the tank. Owing to the great weight of a full tank the stresses imposed on the supports at high car speeds are heavy, and the supports should be made of adequate strength to withstand the load and protect the joints of the tank. A rear-hung tank must not be supported too rigidly, as the frame weaves. Probably the best method is to use straps of 18 or 20 gauge steel about 1½ in. wide, lined with brake lining (or anti-squeak material). In the case of drawn tanks with projecting longitudinal seams, it is necessary to use bolster plates, as shown at 4A, to prevent the supporting straps from bending over the seams and breaking them open.

As an illustration of the troubles sometimes experienced with tanks and the reasons therefor, the engineer of the Geuder, Paeschke & Frey Co. told the writer of the following case: One automobile company received continuous complaints about end seam leaks in their fuel tanks, but the trouble seemed to be limited to the runabout and coupe models. An investigation showed that the spring clip hit the seam of the tank, which was due to lighter springs being used on these models than on the touring model, which permitted unusual deflection and side sway.

Soldered Seams Not Dependable

Solder should not be depended on to take strains, but only to act as a seal. The former applies also to spot welding. Where strains must be taken up rivets should always be used.

Gasoline tanks are made by the Geuder, Paeschke & Frey Co. both with and without sediment cups. If the gasoline feed tube enters at the top it is well to secure it at the bottom to prevent vibration. It has been found preferable to put the filler spouts on the body rather than on one of the heads. If the spout is placed on top of the body it is impossible to get an air trap and the tank can be filled full without difficulty.

Geuder, Paeschke & Frey have been specializing in deep drawing work since 1881. They confine themselves to drawings of light gauges, Nos. 10 and 11 being their heavy limits. Small drawings from heavy stock, such as hub caps, brake drums, rear axle housings, etc., are not made because the company's presses cannot be advantageously used for such parts.

Some of the automobile parts other than gasoline tanks which the firm is producing in great numbers are radiator shells, engine oil pans, gear covers, cylinder head covers, side cover plates, top water manifolds, flywheel housings, miscellaneous covers, rocker arm housings and pulleys for Vee belts. By reason of its electric spot and autogenous welding facilities in conjunction with its press and die sinking equipment the company can produce very complicated stamped and drawn assemblies.

Engine Oil Pans

Probably one of the most advantageous applications of deep drawing in automobile construction is in the production of oil pans for engines. In deep drawing the gauge of the metal is practically not changed. A drawn steel oil pan weighs about the same as an aluminum pan, but is much cheaper to make and, besides, it is practically indestructible. It can be dented, but the dent can be hammered out again.

A great deal of drawn work requires to be rust-proofed in some way, and if several parts are assembled they must be rust-proofed after assembling, for riveting and similar methods are apt to injure the rust proofing. This applies particularly in the case of oil pans for engines. Geuder, Paeschke & Frey either terne coat or galvanize the pans after assembly. After the pan has been galvanized or terne coated, it presents an ideal surface for soldering on fittings, so that the pan is made oil tight. The fittings that must be secured to the pan include drain flanges, gauge fittings and oil supply fittings. A starting crank bracket casting may be riveted and sweated to the timing gear cover in this way and thus provide a most satisfactory substitute for the grey iron or aluminum casting formerly used.

As regards interchangeability, drawn steel parts compare very favorably with machined castings. They are formed and perforated on dies and are fully interchangeable. All are inspected, of course, before leaving the plant.

Cork Gaskets Used

Wherever an oil-tight joint is required a cork gasket 1/16 in. thick is used, and is shellacked either on one side or on both sides. It is claimed that a properly designed stamping will not give any more trouble from oil leakage than a machined casting. The usual practice in connection with pressed steel oil pans is to let the end opening edges enter into grooves on the bearing caps, which are packed with felt. Some firms, however, machine the end openings of the stampings to exact dimensions and fit them against the bearings.

Drawn steel radiator shells are now very extensively used on passenger cars, except on cars of small production, which do not warrant the tool expense. The use of a pressed steel radiator shell reduces the cost of the radiator, because it makes it unnecessary to finish the core all over; it protects the core and tanks and yet makes them more accessible for repairs. Also, it is more in harmony with the finish of the rest of the car. Many car builders buy their radiator cores and shells separately, in which case they avoid the risk of damage in transportation and they enamel them them-

(Continued on page 391)

Concerning Wire Rope for Aircraft

Wire Must Show High Elongation as Well as Great Tensile Strength—Tricks in Wire Drawing Permit of Obtaining High Breaking Strength at the Expense of Toughness

IN *Aeronautical Engineering* for Jan. 9, J. and W. Ker Wilson discuss the subject of wire ropes as used in airplane construction. They express the belief that eventually it will be possible to make flexible cable in streamline form, and to dispense with the unreliable streamline solid wire. Wire rope is frequently the weakest link in strong engineering structures. The material should not only have sufficient strength, but also sufficient elasticity to withstand the severe stresses imposed upon it. In the authors' opinion, elasticity is fully as important a property as tensile strength, and a tensile test alone is not sufficient for judging the wire. There is a possibility that in the future a simple form of streamline fairing will be developed, which will eliminate the so-called "vibrant strains." Not only does the fairing reduce the vibration and consequently the strain upon the wire, but it greatly reduces the resistance to motion. It is claimed that a small wire vibrating rapidly offers as much resistance to motion as a flat surface as wide as the amplitude of the vibration.

Hardened by Drawing Process

All rope specifications should provide for not only torsion, bending and tensile tests of the individual wire after drawing, but also for the material in rod form before drawing. Wire rope of the requisite quality can not be produced from cheap material. The following practice is to be absolutely condemned. A manufacturer starts with low carbon rod, anneals it and instead of drawing it down by one-half to one-quarter gage sizes, pulls it down to the required size in steps of $1\frac{1}{2}$ to 2 sizes. The stresses thus imposed upon the material harden the wire at the cost of elasticity. If tensile strength is the only test called for, such a wire may pass. In one instance a manufacturer ordered 120-ton quality wire from his wire drawer to show 135 to 140 ton tensile strength in individual wire form. The idea was that such abnormal wire would show a high tensile strength when made up into rope form, with a straight-pull test, and so satisfy inspection. With proper inspection no wire showing a greater breakage stress than 125 tons would be accepted. The authors emphasize that, in the future, specifications of wire rope must not only demand a certain breaking load but also specify the elongation.

Hardness may be further intensified by very high machine speed in stranding and closing the rope. If the elastic limit is not exceeded in the drawing operation no hardness results, but if the drawing subjects the material to stresses beyond the elastic limit, a certain amount of permanent set is produced and hardness is the result. The more the stress exceeds the elastic limit the greater the hardness. Of course, in all wire drawing the elastic limit is exceeded.

Hardness can be kept within reasonable limits in three ways, viz., (1) by giving careful heat treatment during manufacture; (2) by carefully drawing down the wire by one-quarter to one-half

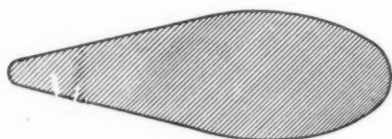


Fig. 1

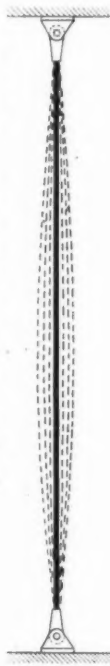


Fig. 2

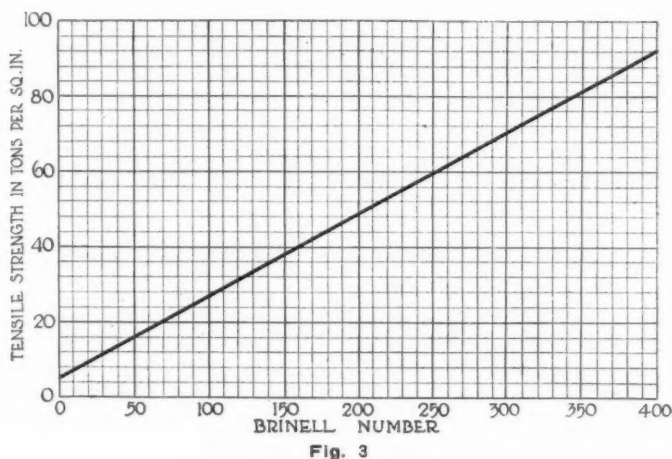


Fig. 3

sizes; (3) by using durable speed (moderate) for stranding and closing the rope. A certain amount of hardness is desirable, because, for a given weight, hard-drawn steel wire will support a heavier load than the untreated steel; but it must always be remembered that the increased tenacity has been obtained at the expense of elasticity, and the hardening should never be carried so far that the material becomes dangerously brittle. Fig. 3 shows how hardening the material raises its tensile strength and reduces its elasticity, or what is more correctly called its plasticity.

The authors made a study of the relation between the Brinell hardness numbers of drawn steel and its tensile strength. This relation may be very closely expressed by the following equation:

Tensile strength in tons per square inch = $0.213 \text{ Brinell number} + 5$.

In the report of the hardness test research committee Dr. Unwin stated that the ratio of tensile strength to hardness number was very nearly 0.325.

Stranding Produces Stresses

As previously pointed out, the usual practice in stranding wire is to draw the wire at high speed through imperfectly made machines, thereby subjecting the wire to terrific stresses. The wire is drawn from the spools through the closing die, thence around a large diameter drum and so on to a take-off reel. Unbelievable though it may seem, when drawing high tensile wire, the same speed is used as in stranding ordinary mild steel wire. It is the opinion of Messrs. Wilson that many failures of high tensile wire in service can be traced to the terrible stresses imposed on individual wires when being laid together and stranded at high speeds. The same criticism may be passed upon the operation known as closing, when the finished strands are laid together and twisted into rope form. Frequently, the wire forming the crown of the rope—the outside wires—are cut during their rapid passage through the closing die sufficiently to reduce their strength individually 50 per cent.

Steel rope intended for stranding members on aircraft need not possess as much flexibility as inner and outer drag wires, lift wires and diagonal bracing. These wires could be Lang's Lay instead of the ordinary Lay, the strands and rope being laid opposite and so causing additional stress.

For a test of wire ropes in the finished form the authors recommend the following: The load is run up to 25 per

cent of the guaranteed breaking load and is then taken off, when the permanent set can easily be measured with an ordinary rule. This operation is repeated for loads of 50 per cent and 75 per cent and finally the breaking load itself is determined. An extension of 5 per cent to 10 per cent on a length of about 25 in. should be insisted upon. Care must be exercised to insure that the initial straightening out of the strands is not measured as extension. To this end one-sixth of the breaking load is allowed for straightening out the wire. The ultimate tensile strength is then 6/5 of the value recorded by the testing machine.

It is recommended that the Air Board provide for analysis, tensile and bend tests of the steel in rod form before the manufacture of wire begins. A very searching torsion test should be made of the finished individual wires and of course also a tensile test. The specifications should also include a maximum rate of speed for all machinery forming high tensile wires into strands, to safeguard against over-stressing the wire at too high speed. Further, the sequence of gage sizes through which the wire is to be drawn might be specified, as well as the limiting hardness after drawing.

Increasing Oil Recovery from Sands

A COPY has been received of Bulletin 148 issued by the Bureau of Mines and dealing with methods for increasing the recovery of oil from oil sand. J. O. Lewis is the author of the bulletin. According to Mr. Lewis's investigation, less than 50 per cent of the oil in the average field remains unrecovered when the field is abandoned as exhausted. In the bulletin referred to are considered the principles involved in increasing recovery and methods of extracting more oil from the oil bearing formations than by the usual ways of producing. These methods are: The use of gas or vacuum pump, forcing compressed air or gas through the oil bearing formations, displacing the oil by water, and better utilization of the natural pressure in the oil bearing formation. Special attention is being given to a process—commonly known as the Smith-Dunn—for forcing compressed air through oil bearing formations.

Aspect Ratio and Critical Angle

IN a recent issue of *Engineering* C. H. Powell discusses the influence of the aspect ratio on the critical angle of inclined surfaces, which problem has a bearing on airplane design. In the case of a flat plate inclined to a wind it is known that there is a certain angle of incidence at which the lift or cross-wind force is a maximum. This may be called the critical angle. Mr. Powell refers to some experiments made by M. Eiffel on planes of aspect ratio varying from 1/6 to 9* and from these experiments he calculated the values of the critical angle for each plane. These are plotted against aspect ratio in Fig. 1, which shows very clearly the following experimental fact: The critical angle increases as the aspect ratio diminishes according to a definite function.

In view of the natural unsteadiness of the air flow usually experienced at the critical angle it is remarkable that a smooth curve can be drawn through as many as six points out of the eight. Supplementary to this, investigations at the National Physical Laboratory on a long inclined wire, which approaches zero aspect ratio, show that the normal force is very nearly proportional to $\sin^2 \alpha$, where α is the angle of incidence, Fig. 2, i.e.,

$$N = N_{90} \sin^2 \alpha$$

roughly. This is quite in accordance with the foregoing, and it also appears that the nearer we approach to an infinitesimally small aspect ratio, or, the closer the inclined edges of a plane approach together and mutually affect each other, the more nearly will the normal force be proportional to $\sin^2 \alpha$. It is interesting to note that Newton deduced this *sine squared* law for a purely hypothetical fluid.

An investigation is made of the value of the critical angle for the case where the normal force is coincident with the resultant and varies as $\sin^2 \alpha$.

Let L represent lift and N normal force, then

$$L = N \cos \alpha = N_{90} \alpha, \cos \alpha$$

For maximum value of L we have by differentiating and equating to zero:

$$\frac{dL}{d\alpha} = N_{90} [2 \sin \alpha \cos^2 \alpha - \sin^3 \alpha] = 0$$

Whence

$$\sin \alpha = \frac{2}{3} = .667$$

or

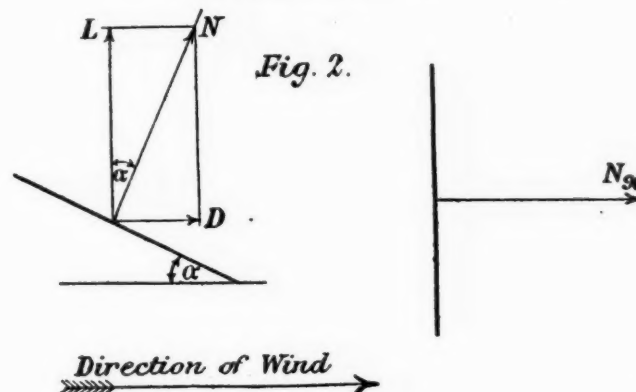
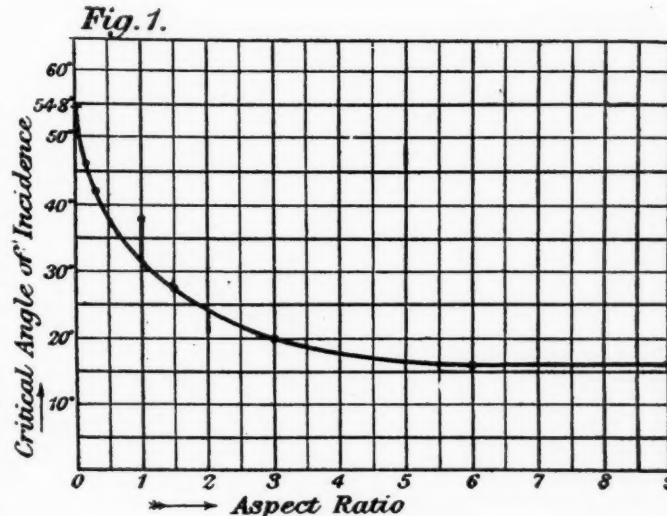
$$\alpha = 54.8 \text{ deg.}$$

This angle is marked in Fig. 1 in the position for aspect ratio \rightarrow zero.

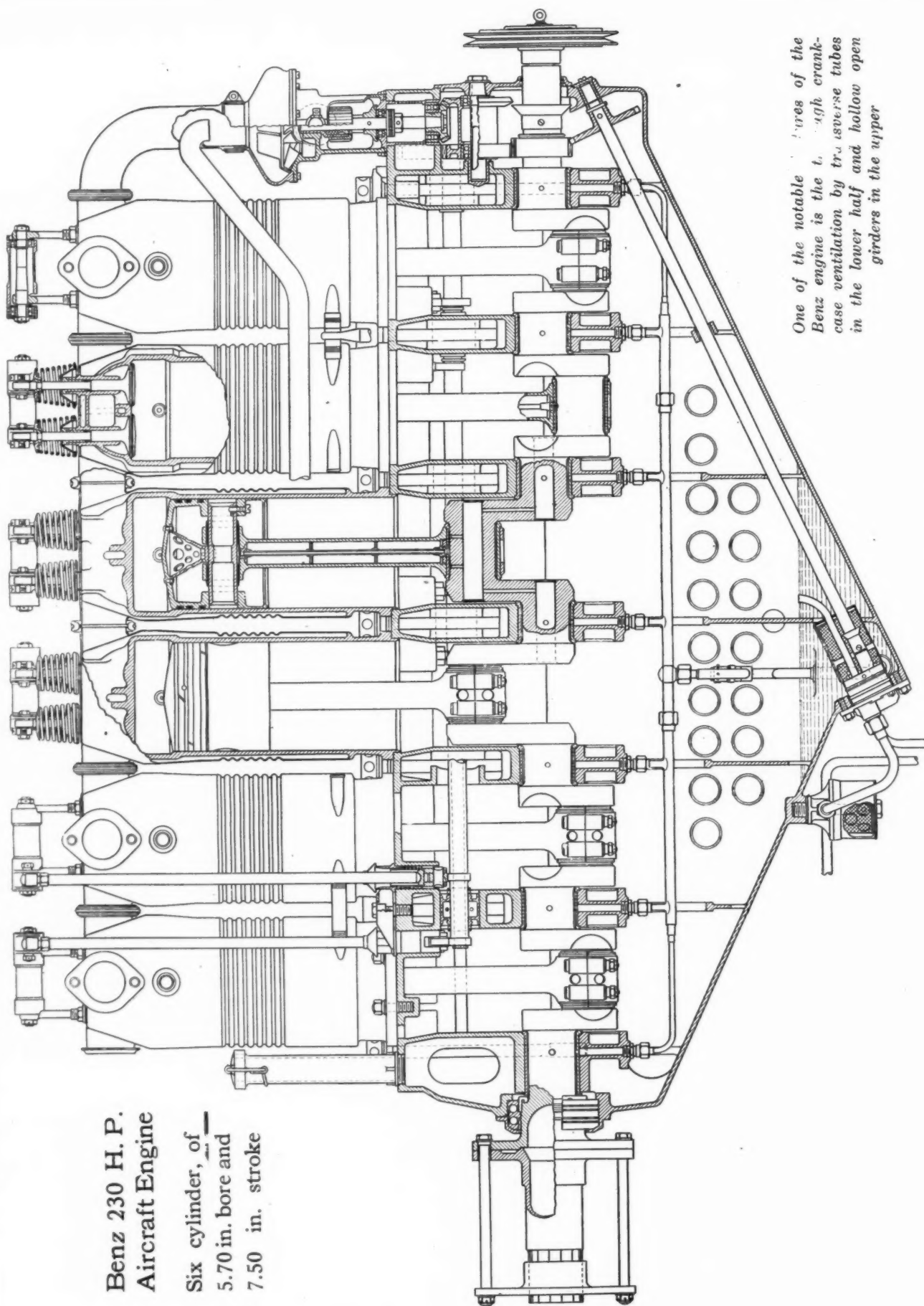
It must be understood that variations in speed have also a considerable effect upon the critical angle. In the case of higher speeds than that of the experiments a curve would be obtained similar to, but probably slightly above that in Fig. 1, still, however, passing through 54.8 deg. for zero aspect ratio; while for lower speeds the criticals would occur at lower angles.

The practical importance of high critical angles from an airplane designer's point of view is that a control surface, such as a rudder or elevator of high aspect ratio, will not give any further effect on the airplane after about 20 deg., whereas it is desirable for special maneuvers and "taxying" that the control surfaces should give a cross wind force increasing with angle throughout their range of movement, which at the present time on most machines is generally not greater than 40 deg.

The arrangement of having the controls as being part of the fin or tail, as the case may be, has the effect of increasing the critical angle because the aspect ratio of the combined surface is lower than that of either movable surface alone. There is no particular advantage of having the directive organs and control surfaces of a very efficient type usually associated with high aspect ratio. The main point is that they should respond evenly to the joy stick and rudder bar movements.



*"La Resistance de l'Air et l'Aviation, 1911," pages 44-134.



Benz 230 H. P.
Aircraft Engine

Six cylinder, of —
5.70 in. bore and
7.50 in. stroke

One of the notable features of the Benz engine is the transverse tubes in the lower half and hollow open girders in the upper

The Benz 230-Hp. Aircraft Engine

Has Cast Iron Cylinder and Head Castings in One Piece and Sheet Steel Jackets—
Four Valves Per Cylinder Operated from a Camshaft
in the Crank Case

A FURTHER instalment of data on enemy aircraft engines has been issued by the British Air Board, this covering in very great detail the Benz 230-hp. engine. The design is in many respects similar to the 160-hp. engine of the same make described in a recent issue and the weight efficiency is almost exactly the same, viz., 3.68 lb. per horsepower. Owing to the strong trend in the direction of increased power this larger engine is, of course, of the greater interest. The illustrations are reproduced from the *Automobile Engineer*.

The 230-hp. Benz engine, 145 mm. bore by 190 mm. stroke, as fitted to the Aviatik biplane, follows the usual German practice for aircraft engines of this type. It is a six-cylinder vertical water-cooled layout, each separate cylinder bolting to the crank case by long studs which pass through the top half of the crank chamber and secure the crank-shaft bearings between the top and bottom halves.

Two inlet and exhaust valves are fitted in the head of each cylinder, and they are operated through overhead valve rockers mounted on ball bearings, the rockers being actuated by push rods on either side of the cylinders in the usual manner. The two camshafts, which run in plain bearings, are, as usual, arranged inside the top half of the crank case, and the floating exhaust camshaft carries the usual half compression cams.

The pistons are of cast iron, fitted with three exceptionally wide rings, and the piston heads, following usual Benz practice, are supported by conical steel forgings riveted and welded to the piston crown, these supports bearing on the center portion of the gudgeon pins through slots cut in the connecting-rod small ends.

As in the 160-hp. Benz engines, two separate two-jet carbureters are fitted, each having its air intake passages through the top half of the crankcase casting. The carbureters supply three cylinders each, through independent branched induction pipes built up of light aluminium tube.

The lubrication of the crankshaft and connecting rod bearings is effected by a gear pump of very interesting design, which works in an auxiliary oil reservoir formed in the bottom of the air-cooled base chamber.

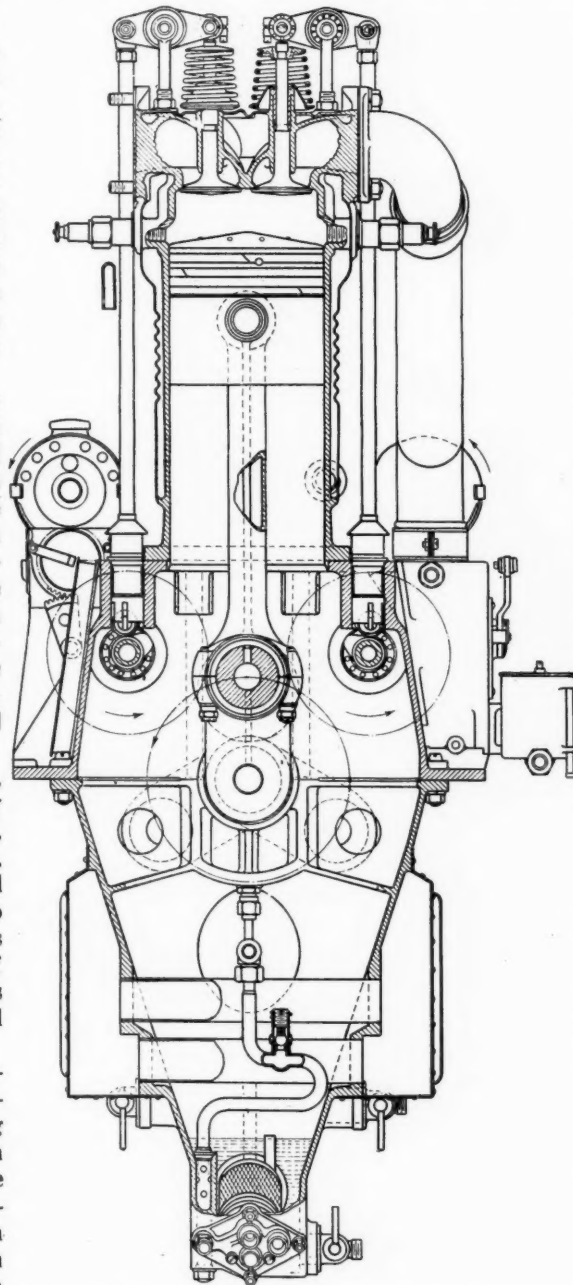
An oil-sealed fuel pump supplies gasoline to the carbureters in conjunction with a supplementary pressure reservoir enclosed in the main fuel tank. The pump is driven off the rear end of the inlet camshaft, the same driving spindle also operating the machine gun interrupter gear and the tachometer drive.

Except for the steel water-jackets, the cylinders are entirely of cast iron, the water-jacketed heads, including the twin inlet and exhaust valve passages, being cast integral with the cylinder bodies.

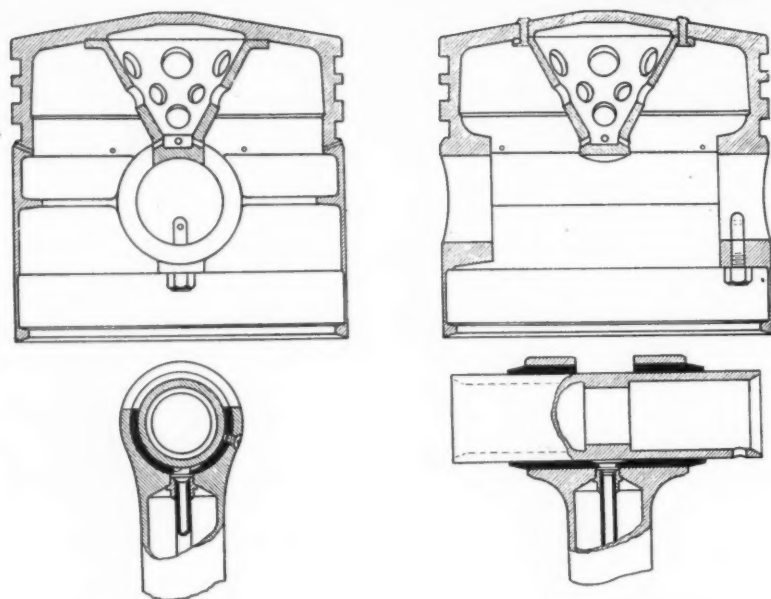
Pressed steel water-jackets are fitted, these being built up in half sections and welded together at the vertical joints. At the bottom they are welded to flanges machined on the outside of the cylinders. The cylinder walls are taper, being 5.5 mm. at the base and 6.5 mm. at the top. Exceptionally long water-jackets are arranged, these extending to within 45 mm. of the cylinder base flanges. Seven annular corrugations are formed about the center of the jackets to allow for expansion, and three transversely in the jacketing over the heads. The general construction of the cylinders and jackets with their water connections is clearly shown in the various illustrations.

The arrangement of the water space in the cylinder heads and around the valve pockets is well carried out, and, in addition, dished plates are welded in the water space above the crown of each cylinder to deflect the flow of water on to the exhaust valve pockets. The diameter of the cylinder head water connections is 60 mm.

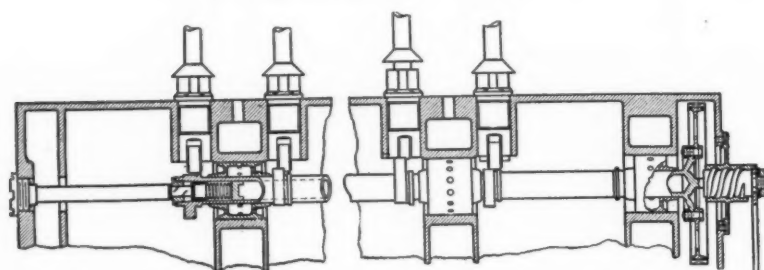
The cylinder registers extend well into the crankcase top, being 10 mm. deep, and the cylinder flanges are held by four 12 mm. studs and also by dogs at four points. The dogs are pulled down through long studs that pass through the top half of the



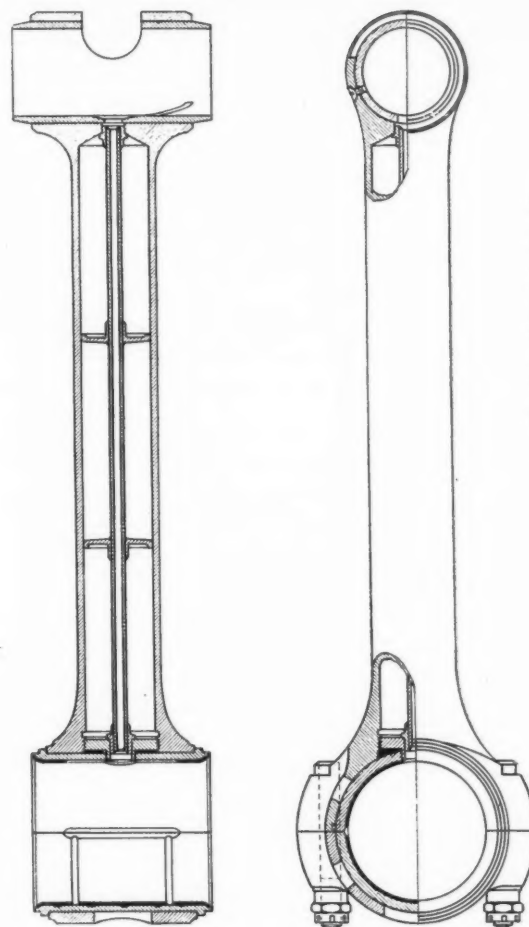
Transverse section through engine



Sectional views of the piston, showing the hollow conical pillar supporting the piston pin



Arrangement of exhaust camshaft and compression relief



The tubular connecting rod

crank chamber and are screwed into the bottom halves of the main bearing housings, cast integral with the base chamber. The portions of the holding-down studs that screw into the aluminium are of larger diameter and of coarser pitch. The nuts that secure the holding-down dogs are of interesting design, being of circular cupped formation drilled radially with four 12 mm. holes for application of the "tommy bar." The total weight of each cylinder, complete with valves, valve springs and valve rocker supports, is 44.25 lb.

Pistons

The pistons, with the exception of the small conical pillars, are entirely of cast iron, and weigh 7.62 lb. each, complete with rings and piston pin. Three rings are arranged above the piston pin, the lower one being a scraper ring. Each ring is 8 mm. wide, and the width of gap when fitted is .45 mm. The two top rings are 4.25 mm. apart, while the scraper ring is 10 mm. below; 4 mm. diameter pins are provided to locate the radial position of each ring, and six 2 mm. holes are drilled equally spaced around a slight annular recess below the scraper ring.

The hollow conical pillar supporting the piston head is machined from a steel forging, and is riveted in place, as shown in the sections of the piston. The lower end of the pillar, which is finished in position at the same time as the holes in the piston pin bosses, bears on the center part of the piston pin, and to accomplish this a portion of the top of the connecting rod small end and piston pin bush is cut away. By this construction the greater part of the force of the explosion is transmitted from the head of the piston to the connecting rod.

The piston pins are 38 mm. diameter, bored with a 30 mm. hole at the ends, while the center portion is bored 25 mm. for a length of 20 mm. where the conical piston head support bears. The diameter at the top of the piston is 144.15 mm., and at the bottom 144.67 mm. The piston ring side clearance is 0.004 in.

Connecting Rods

In general design these are fairly orthodox, as will be seen from the illustrations. The whole of the rod, including the lugs for the four bolts securing the halves of the big end, is machined all over from a steel forging. The outside diameter of the rod is 36 mm., and a 30-mm. hole is bored from the crank pin end to within 6 mm. of the piston pin bush, the hole being closed at the big end with a threaded plug. The big end itself is lightened by four 12 mm. holes and one 30-mm. hole drilled radially.

A 6-mm. steel pipe, for lubricating the piston pin, is fixed inside the center of the connecting rod, the pipe being supported in the center by two flanged discs, as shown in the illustrations. Two semicircular oil grooves are machined in the white metal big end bearing caps, and one lateral groove is cut in the top of the big end bearing. The total weight of the complete connecting rod is 7 lb. 1 oz., the big end weighing 4 lb. 12 oz. and the small end 2 lb. 5 oz. The total big end side clearance is 0.15 mm., and the float of the small end bush between the piston pin bosses is 14 mm.

Crankshaft

The six-throw crankshaft runs in seven plain bearings; it weighs 109.25 lb., including the propeller boss, and the cranks are, of course, set at 120 deg.

The diameter of the journals is 62 mm., while that of the crank pins is 60 mm. The length of the front journal bearing (propeller end) is 79 mm., and the length of the other journal bearings is 54 mm., with the exception of the rear end bearing, which is 55 mm.

The crank pins and journals are bored, the webs being drilled with communicating lubrication holes in the usual manner. The diameter of the holes bored in both the crank pins and journals is 27 mm., and the ends are plugged with sheet steel discs sweated into the recessed ends. All the discs which plug the rear ends of the holes in both the crank pins and journals are drilled with a central 5 mm. hole to provide a certain amount of splash lubrication for general purposes.

A double-thrust ball race, 120 mm. diameter, is fitted at the front end of the crankshaft behind the front flange

to which the propeller hub is bolted. The thrust races are large enough to be assembled over the cranks, and are secured in position by a split collar which is screwed on to the crankshaft. The halves of the split collar are held together on the shaft by an undercut shoulder on the crankshaft which engages a recess in the split collar.

Fitted to the rear end of the crankshaft is a friction clutch for transmitting the wireless drive, the control being so arranged that the clutch can be operated from the pilot's seat. The propeller boss is coupled to the crankshaft by a flange which bolts to a corresponding flange on the end of the crankshaft; eight 14-mm. bolts are fitted.

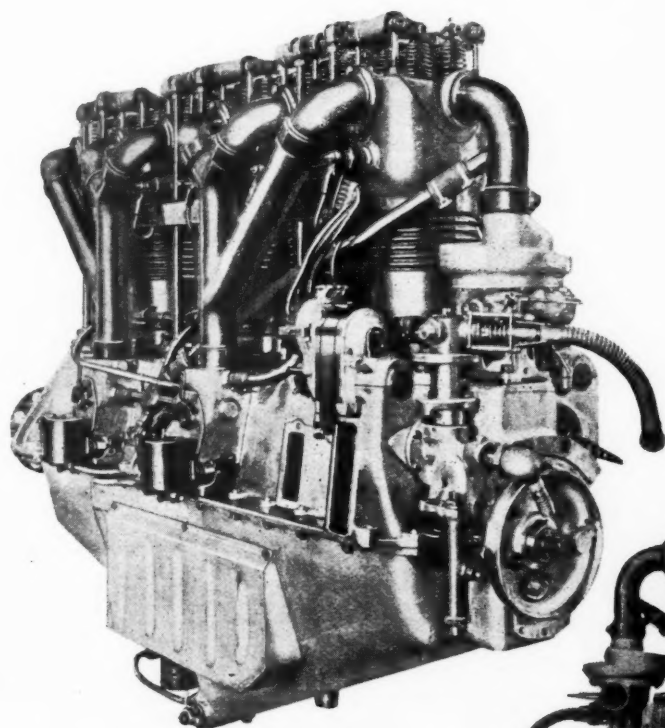
Valves and Valve Gear

The twin inlet and exhaust valves are arranged vertically in the cylinder heads, and, as previously mentioned, are actuated through rockers mounted on ball bearings that are carried by supports screwed into the cylinder head.

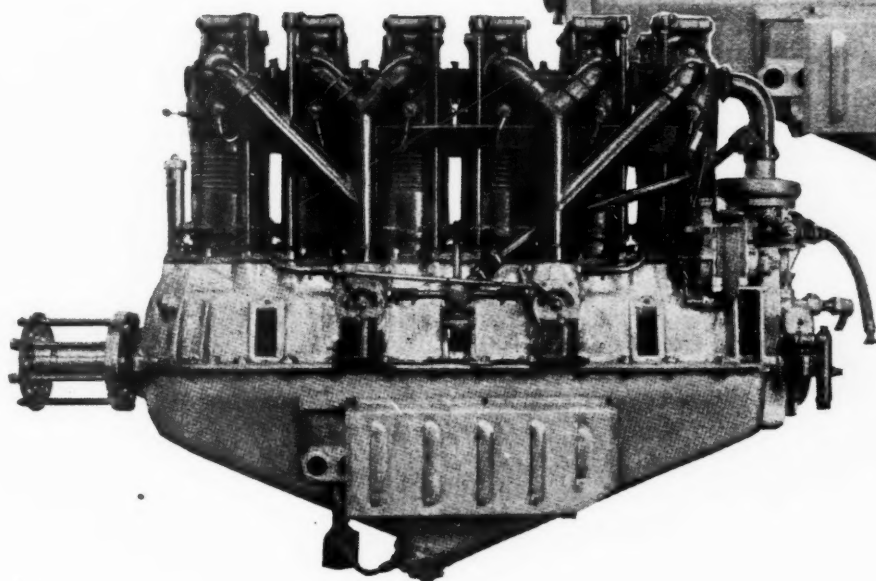
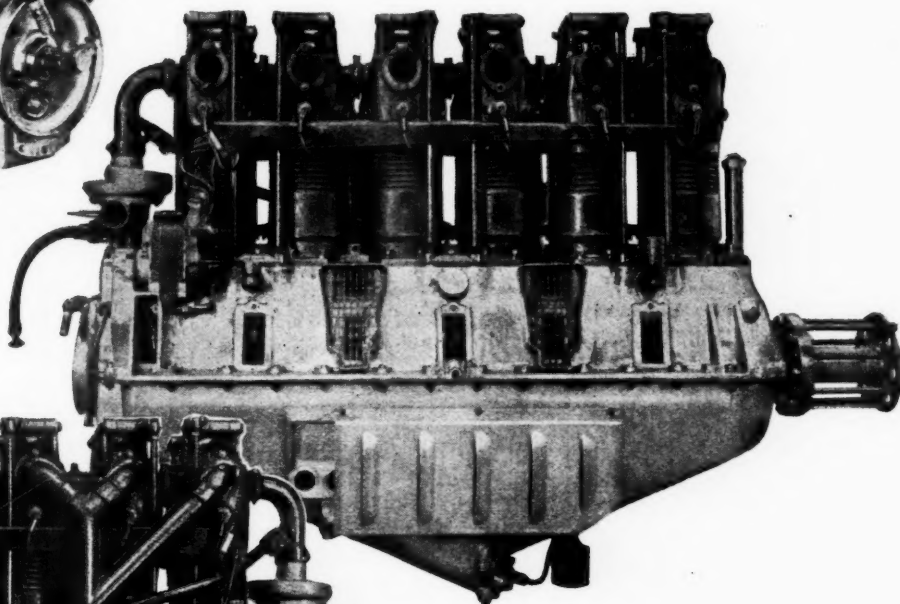
The rocker lever actuates the valves through hardened steel rollers, mounted on eccentric bolts; these, in conjunction with adjustable spherical joints screwed into the top ends of the vertical push rods on each side of the cylinders, give a fine adjustment for the tappet clearances. Spherical joints on the valve rockers are provided to simplify the alignment of the valve rocker supports which are screwed into the cylinder heads.

Semi-spherical ends are arranged at the bottoms of the push rods, which work in steel cups inside the hollow tappets. Hardened steel rollers are fitted to the tappets, which are slightly offset from the camshaft centers. Each pair of tappet guides is held in position by a steel dog.

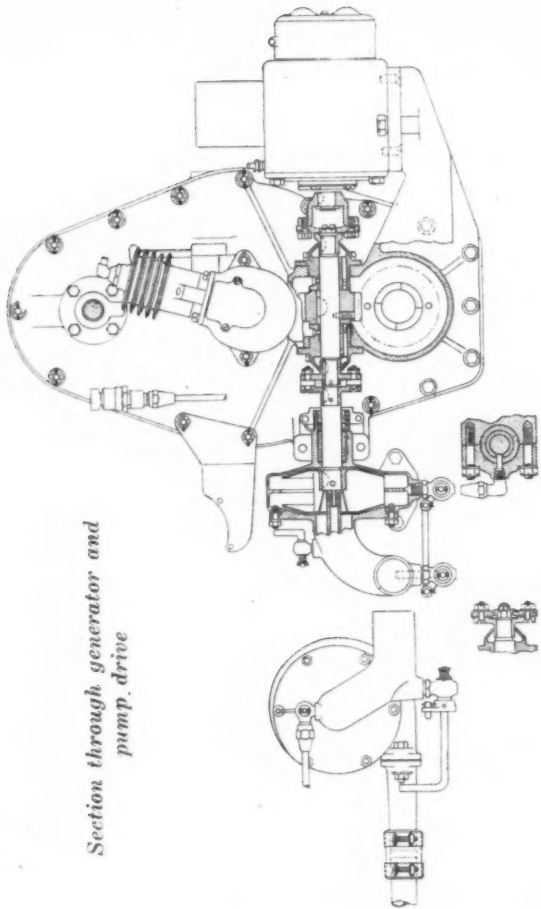
(To be continued)



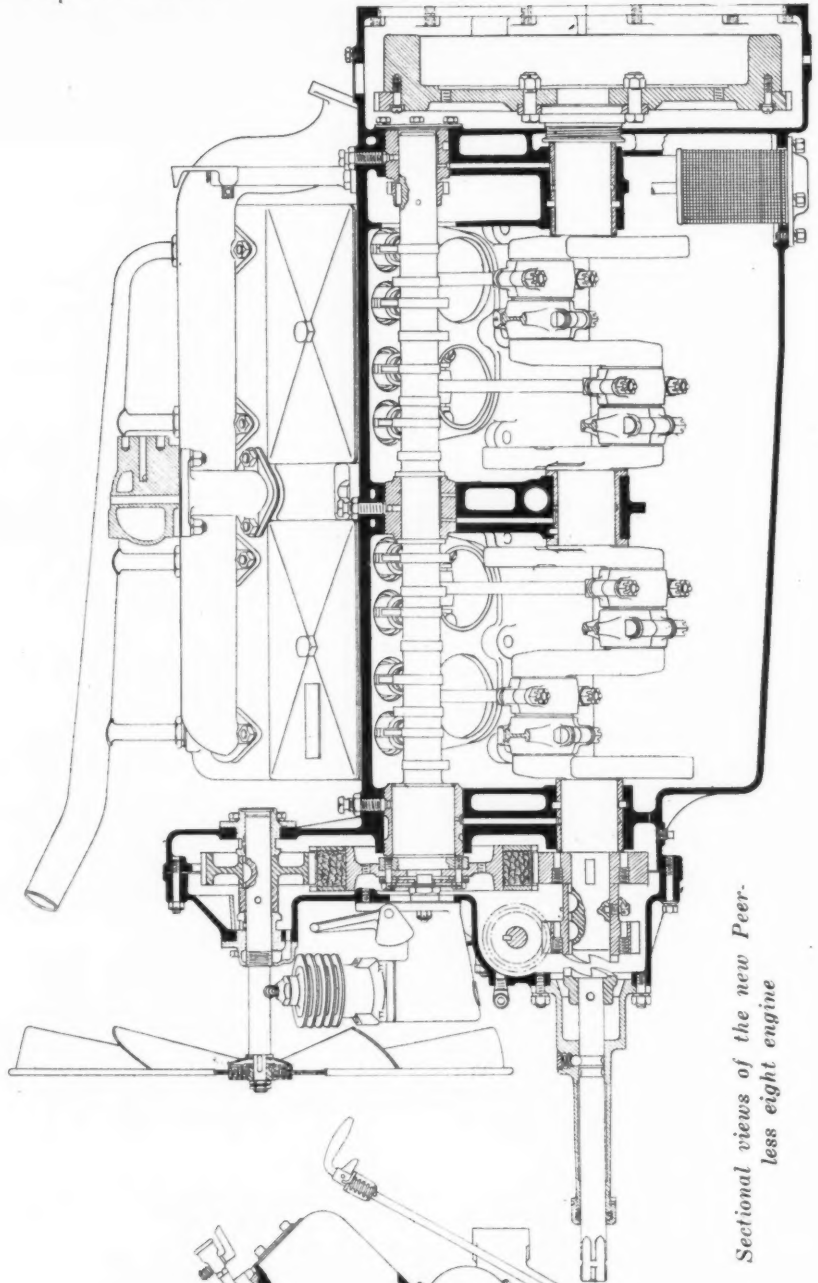
Three-quarter forward view of engine



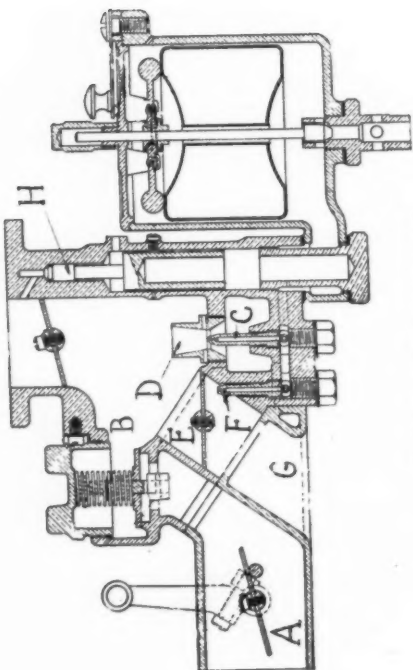
Right and left side views of engine, showing crankcase ventilating means and screened carburetor air inlets



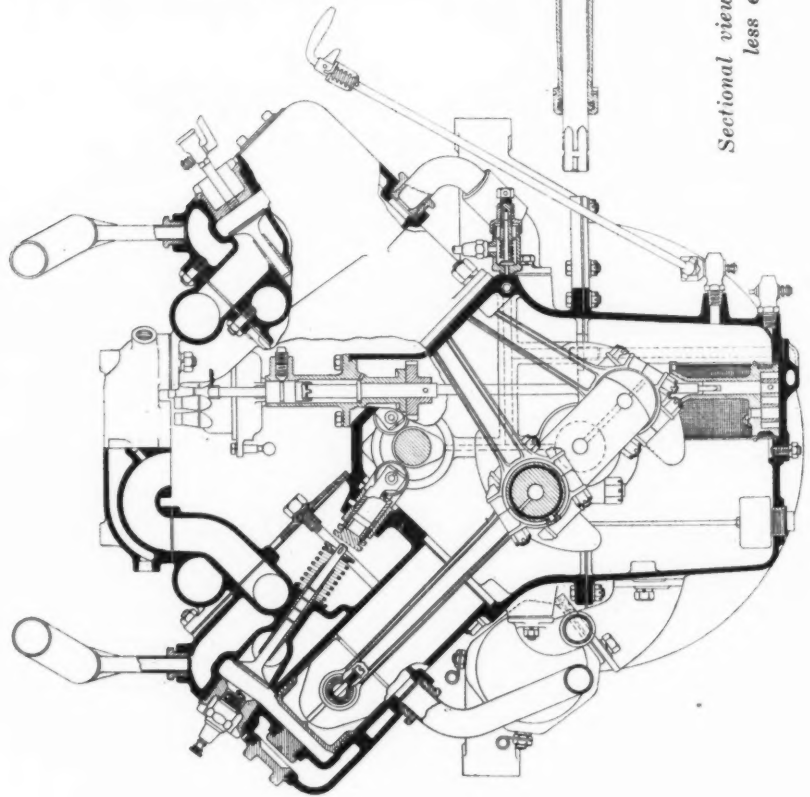
Section through generator and pump drive



Sectional views of the new Peerless eight engine



Ball & Ball carburetor



Changes in Peerless Eight and Reasons Therefor

SINCE the introduction of the Peerless eight-cylinder engine two years ago, some important refinements have been made, notably in the valve action and in the layout of the accessories. The sectional views give a general impression regarding the refinements which it has been possible to make in the light of experience and advanced practice.

Probably the most radical change is in the valve action. The rocker arms formerly employed have been eliminated by inclining the valves, and at the same time water-jacket space has been gained and the valves are actuated directly by roller followers on the cam. This change in the valve action has necessitated alterations in both the crankcase and cylinder block castings, and, while adding a little metal to these, has more than compensated for this by greatly simplifying the valve action. By the old method a rocker arm was used, pivoted at one end and carrying a roller follower between this pivot point and the point at which the rocker arm engaged the push rod. Thus the action of the cam was multiplied to some extent, owing to the fact that the follower was closer to the pivot center than the point of contact with the valve push rod.

The valve mechanism as it stands now is lighter and simpler. Hollow tappets are used, with an increased amount of bearing surface and better adjustment features. The combustion chamber has been slightly altered in shape, this being made necessary by the valve entering it at an angle.

Another important change is in the mounting of the tire pump, which has been removed from the side, where it was driven by an extension of the fan shaft, and is now bolted in front of the engine and connected with a clutch to the camshaft. Formerly it was connected by means of wing nuts, as it had to be removed in order to render the valve action accessible. With the present arrangement the inside of the V is rendered much more clear and it is not necessary to touch the tire pump.

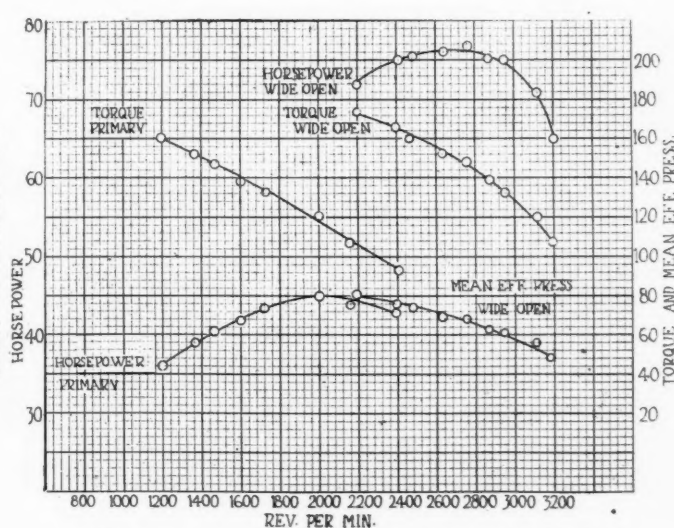
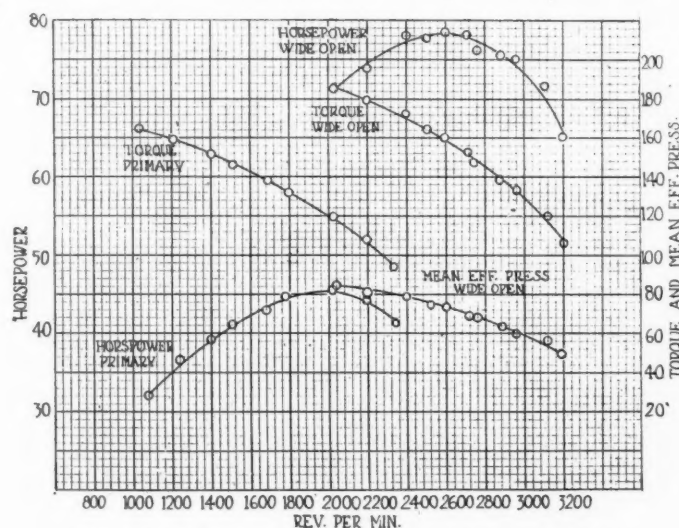
A great many other minor changes have been made to increase accessibility and facilitate manufacturing operations. For instance, the crankcase oil-gage cock oper-

ating handle has been brought up so that it is now on a level with the top of the cylinder, whereas it was formerly much lower and rather difficult to reach.

It is interesting to note the results which are obtained from a power plant of this capacity. The cylinders are $3\frac{1}{4} \times 5$ in., set at 90 deg. The S. A. E. rating is 33.8 hp., but the actual brake horsepower is approximately 80 at 2700 r.p.m. Two sets of curves are given herewith, one set showing the results with a water-jacketed inlet heater, and the other with exhaust heated inlet. Both are with a $1\frac{1}{8}$ in. double standard Ball & Ball carbureter, with 66-67 primary jet and 54-57 secondary.

The two carbureter ranges are clearly brought out on these curves. With the primary, or lower running range, the maximum horsepower developed is 45 at 2000 r.p.m. The primary torque is above 160 ft.-lb. at 1000 r.p.m. on the primary range, and above 180 ft.-lb. at 2000 r.p.m. on the secondary, or wide-open range. The mean effective pressures are also plotted against r.p.m. for the wide-open range of the carbureter and show a pressure of around 85 lb. per sq. in. at 2000 r.p.m. These readings are all taken off the exhaust-heated inlet chart, and, as will be noted, are quite closely approximated in the other chart which shows results obtained with the inlet water-jacketed.

The Ball carbureter used on this engine is shown in Fig. 3. It is a two-stage instrument, the primary operation being taken care of by means of the air inlet A and auxiliary air spring valve B. The gasoline for the primary action enters through the jet C by means of the venturi D. For the secondary range, the throttle E is opened by means of a connecting link with the throttle above the mixing chamber, bringing into action the jet F and an additional supply of air through the opening G. There is also an acceleration well with a pick-up plunger at H, giving a quick supply of gasoline when the throttle valves are opened suddenly. Under normal conditions, the primary jet C is a No. 65 drill hole, and the secondary a No. 58. For higher altitudes, from 68 to 70 may be used on the primary, and No. 60 on the secondary.





The F O R V M



Advantages of a Hand-Controlled Air Valve

By Charles E. Manierre

THERE is, of course, every reason at the present time to save as much as possible in the use of gasoline. The rising price of this commodity is the least of several reasons which need not be specified. Each of the various ways in which gasoline is wasted is worthy of consideration, and the stoppage of waste in each direction saves just so much of the fuel.

The particular loss which is at the moment considered is that sustained while the car is descending a steep grade and the engine is being used as a brake. Of course the throttle is closed. As a matter of fact, it is well understood that a so-called closed throttle is partly open. In truth it is so far open that the engine is capable of idling with the throttle in that position. Moreover, while idling, the spark is much retarded and therefore the engine is performing at a great disadvantage and also turning very slowly.

Far more mixture is drawn in through the "closed" throttle than necessary. In fact it has been stated by one investigator that enough gasoline was consumed to run the car at the rate of 20 m.p.h. on a good level road. However that may be, it must be evident that an appreciable portion of gasoline is wasted.

There is but one apparent remedy for this loss, and that remedy is a sufficiently large opening in the intake manifold above the carbureter, which can be controlled from the dash. The necessary size of this seems to be the equivalent of what would be needed for a $\frac{3}{8}$ or $\frac{1}{2}$ in. pipe. When this opening is uncovered very little suction would be evident past the gasoline needle valve, particularly when the throttle is closed.

All authorities agree that the use of the engine as a brake does it no harm and is a proper and sometimes a vital and necessary procedure.

In a country of steep hills a very considerable saving should result from the use of such an opening in the manifold.

There are now upon the market a variety of devices to be installed upon the intake manifold, some of which supply only water and others of which supply in addition or exclusively either a fixed or a variable amount of air. A considerable saving of gasoline is claimed by all of these devices. It is probable that all of them do make such saving, and for two reasons. The water, whether in the form of steam or liquid, tends strongly to keep down the quantity of carbon formed in the cylinders and perhaps to cause it to assume its powdery amorphous condition. Certainly an engine supplied with sufficient water even at irregular intervals is capable of keeping up its efficiency and this naturally results in a very considerable saving of gasoline.

So far as these devices automatically admit air, they may be regarded as supplemental to the carbureter and they become practically a part of it, and must receive due consideration in the adjustment of it.

Whether the air opening in these devices is adjustable, either by hand or automatically by a spring, or not, the device constitutes an auxiliary air valve and it has this marked peculiarity, that it is above the throttle and only indirectly subject to the effects of throttle opening and closing. In fact, the closing of the throttle, which diminishes the suction of air below, increases the suction at these auxiliaries.

At high speeds, with open throttle and with some forms of carbureters, the extra air supplied by these auxiliaries is exactly what is not wanted, and this is true also of moderate speeds where the car is upon a slight up grade.

The best results in the running of the car can only be obtained by governing these openings from the dash by a driver

sufficiently skillful to know when the valve should be opened, and how much, and equally important, when it should be closed.

There seems to be on the market to-day no carbureter so arranged as to obviate the advantages of the use of such a valve. The effort of all carbureters has been to obtain a mixture of gasoline and air of a fixed proportion to be delivered to the cylinders under all circumstances, the only choice to the driver being to set the instrument either slightly rich for the greatest power, or a little lean for the greatest economy. This arrangement does not take into consideration that very usual condition of running, in which the throttle is nearly closed and the cylinders take in a minimum quantity of the mixture on the suction stroke, and therefore a mixture much under atmospheric pressure. The compression stroke following is partially ineffective, starting as it does with gas below normal pressure, and the burning of the gas under this diminished compression is not as satisfactory as it would be if the mixture were slightly more lean and a measured quantity of additional air had been allowed to go into the cylinders and thus increase the compression.

The carbureter proper cannot supply this air but a hand controlled auxiliary device on the manifold can, and under the circumstances mentioned actually permits a greater spark advance than is otherwise possible.

Such a device when opened slowly but fully, and if of sufficient capacity, has also the effect of stopping the explosions in the engine. But it does this gradually, diminishing the force of successive explosions, as contrasted with the cutting off of the spark, which brings them to a sudden stop. And likewise, upon slowly closing such a valve, the first explosions are weak and increase smoothly in power, whereas the sudden cutting in of the spark brings a full strength explosion and the strains incident thereto.

In using such a device the sudden wide opening of the air valve is apt, at least with the older form of engines, to sweep into the cylinders a quantity of liquid fuel contained in the manifold and to produce the exact opposite of what the driver intends, i.e., the engine speeds up when he intended it to cease its explosions, and if the clutch is out it races. Likewise the sudden closing of the air valve, when the car is not moving at a suitably high speed, will put a great strain on the clutch and differential mechanism—the counterpart of starting in high gear.

These are both, of course, abuses of the machine, but a careless or an incompetent driver can produce both of these abuses in other ways, and there should therefore be no objection to the use of the device.

Power Generator That Won't Work

By Joseph E. Bissell

IT was with interest that I read your editorial on one Garabed's free power device. I mean your editorial was interesting. Now won't you be so kind as to give your attention for a moment to the device here illustrated and while you are doing it forget all about perpetual motion, so that you can approach the subject with an unbiased mind. I would like you to publish the sketch in your periodical and ask your readers to explain why it will not function after being once brought up to speed.

I tried a small clumsy model and timed it the best I could. I found that it would run 10 sec. longer in the right direction than it would run backwards, which was a very favorable indication. Considering the fact that the mercury seems to squirt out between the shaft at the top bearing, it seems that the mercury stands practically perpendicularly.

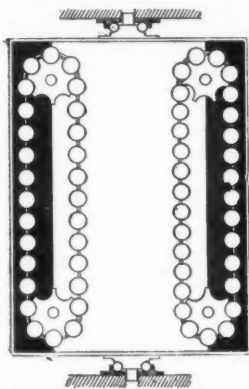


Diagram of the device

Now, if the apparatus, with a radius of 6 in., is spun at 2000 r.p.m., why will not the mercury stand up? And if the balls are as heavy as the mercury, why will they not bear down on the inner side as they hang in the air? If we took the two inner rows out altogether then the two outer rows would not move at all, but stand still, because, weighing the same as the liquid they are immersed in, there is no tendency for them to either rise or sink or move in any direction whatever.

Please look at this seriously. If you are the man who wrote that article I feel quite sure you will. It makes no particle of difference what "they" say; I want to learn the principles of the thing and that is the reason I would like your readers to cast a bias eye at it—not a biased one, though.

Ans.—There are two ways of looking at this proposition, but whichever way you look at it, you arrive at the same result—namely, that there is no reason whatever why there should be any tendency for the chain to turn its sprocket. Disregarding the mercury for the instance, one-half of the chain exactly balances the other half. You will say that owing to one-half of the chain being immersed in mercury and the balls being lighter than the mercury, there will be an upward buoyancy on the balls or chains. This is true. However, there are other effects which neutralize this. The buoyancy results from the fact that the pressure of the mercury

increases with the depth and therefore is less on the top surface than on the bottom surface of any ball. The additional force referred to is the lateral buoyancy as the balls enter and leave the mercury. The pressure of the mercury against the half-excluded ball is much greater than the pressure of the air. Even when the ball is completely immersed in the mercury there is a radially inward buoyancy force on the balls, as the pressure within the mercury due to centrifugal force increases from the inner surface to the outer surface, the same as the pressure due to the weight or to gravity increases from top to bottom.

Let us look at the problem from the standpoint of work done by and upon a ball in passing through the mercury. First, to get the ball entirely into the mercury at the bottom, you have to do work upon it, the same as you have to do upon a piece of wood to submerge it in water. The ball in rising through the mercury from its lowest to its highest position, by reason of the buoyancy of the mercury, is capable of doing a certain amount of work. As a result of the pressure of the mercury upon the ball as the latter passes out of the vertical layer, the ball is capable of doing an additional amount of work. The work which must be done upon the ball to get it into the mercury at the bottom is equal to the sum of the amount which the ball is capable of giving out due to its rise in the mercury and the amount of work due to its exclusion therefrom, consequently the ball will give out only as much mechanical energy as has been expended upon it, leaving no surplus. This result is arrived at by neglecting the friction. Owing to the friction of the balls in the mercury some of the energy given to them is converted into heat and the mechanical energy they are capable of giving out is therefore even less than that imparted to them.—Ed.

University Course for Personnel Managers

New Course of Instruction Designed to Give the Training Required to Men in Charge of Factory Help Opened at Columbia

PERSONNEL management has become a very important phase of factory administration during the past few years. The development of industry on a large scale and the growing strength of organized labor have created a demand for resourceful, wide-visioned, and trained men to handle the human problems arising in the big industries of the country.

The head of the personnel work in a large plant to-day should know the experience of other plants in dealing with their industrial relations problems and the history and purposes of trade unionism, and he should be able to apply this knowledge in the light of the particular circumstances of his own organization.

Columbia University, New York City, has established a course to investigate the complicated problems which personnel managers are called upon to solve. This class, which started Feb. 8, is intended for those who are in the administration end of factory labor departments, for executives who wish to extend their knowledge of methods of meeting employment problems, and for men or women who expect to enter the field of personnel management.

The course will first of all attempt to establish a human point of view toward labor. This sounds academic, theoretic; but it is rather of the utmost practical use. The personnel manager must first of all shape a definite policy, subject to change if it proves unsatisfactory, toward his employees. His methods of carrying out that policy are a comparatively minor matter. Labor's demands are by no means always a matter of dollars and cents. The demand, for instance, is frequently made for the union shop as a matter of principle, without regard to the wage scale. Should the union shop be recognized? What has happened where it has or has not been recognized? How will it work out in any given industry? For settling practical questions such as these, the personnel manager should first have a "point of view," as the announcement calls it, toward labor. In other words he should have a definite attitude toward his subject based on a clear un-

derstanding of his employees both as an organization and as individual human beings.

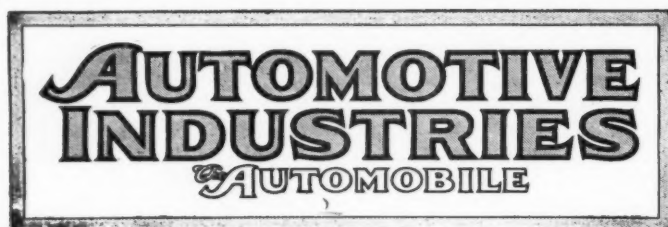
Industrial Relations Work Analyzed

Industrial relations work, represented by the establishment of clubhouses, benefit associations, athletic fields, clubhouses, has been introduced into many large plants. In some cases the experiments have been failures, in others successful. More frequently the projects have been partly satisfactory and partly objectionable. The original "welfare" idea which started this type of work has been practically done away with. The employees will not stand for anything that sounds like charity, and whatever is done in respect to providing recreation and health facilities for the workers must be offered on the principle that it is a partial wage equivalent and a stimulus to greater production. The concrete experiences of industrial relations work in different plants will be used to show how policies of this nature may be worked out.

Labor turnover will be discussed, together with methods of record keeping, and analysis of turnover costs. In connection with the selection of employees existing methods and systems will be considered; and the underlying elements of a sound method will be studied. Successful experiments in the manner of selecting new workers who will "make good" have been carried out at various plants, and these will be brought to the attention of students in this class.

Handling grievances is a job that bothers every labor executive and one that has dynamic possibilities for either the good or the evil of the organization. The stories of men who have been able to solve the question of "kicks" and discharges harmoniously will be used to indicate principles which personnel managers may apply in their own factories.

Ordway Tead, a partner in the firm of Valentine, Tead, & Gregg, industrial counselors, is the instructor in the course which will meet every Friday evening at Hamilton Hall on the university grounds.



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Automotive Industries The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

Standards and Competition

IT appears that some tractor manufacturers look askance at the proposal to introduce standardization in their industry, believing it to be a scheme of the automobile manufacturers to annex the tractor business. It is not only likely that automobile manufacturers will enter the tractor field, but some of the largest of them—Ford, Olds and Maxwell—are already actively engaged in it. However, the entrance of these firms into the tractor field was not in any way related to the standardization plan. All the firms mentioned are among the largest producers in the automobile industry, and they will no doubt operate on a large scale also in the tractor industry. Now, it is a well known fact that standardization is of the greatest benefit to the small and moderate-sized firms. Where a machine is produced on the scale of the Ford car, there is little advantage to the manufacturer in having parts or fittings interchangeable with similar parts on other cars, as the parts have to be produced in such enormous quantities that the pro rata tool cost is insignificant. This is borne out by the fact that the Ford car uses fewer S. A. E. standards than probably any other car made in this country.

If standardization served to help outsiders to enter an established industry, it is not likely that automobile manufacturers would have supported it in their own field so whole-heartedly. It tends to enable the smaller concerns to hold their own against the larger ones, and there have been instances of leading firms in some parts lines opposing standardization, but when carried out rationally standardization has so much inherent merit that even this strong opposition could not stop its progress.

Let no one be deceived as to the future course of the tractor industry. If farming conditions favor the tractor so that the demand can be greatly increased, new firms will continue to enter the industry and will make a bid for patronage in competition with the older firms. Sooner or later the supply will catch up with the demand, competition will become keen and some of the weaker firms may be forced to the wall. This, however, is the natural course of development for any new industry, which cannot be altered by ostrich methods such as antagonizing rational standardization.

Starter Mountings

ONE thing that mitigated against the success of electric starting and generating apparatus on automobiles in former years was that inadequate provision was made in the design of the engines for mounting the starters and generators. By extensive experimentation a method of mounting was finally arrived at which seemed to be superior to all others, and its advantages were so generally admitted that it was standardized by the S. A. E. It is known as the flange mounting, the starter or generator being provided with a substantial flange at the driving end by which it is bolted to the flywheel housing or the timing gear housing. The flanges are provided with pilots to locate the starter or generator accurately in a bored hole in the housing if gear drive is used, but in the case of chain drive for the generator the pilot is given a certain amount of play and adjustment can be made by means of slots in the flange for the two upper bolts, which permit the machine to be swung toward and away from the crank axis around the axis of the lower retaining bolt.

Electric starting and lighting apparatus is rapidly being adopted in motor boat work, especially in connection with large engines which are difficult to start by hand. In fact, some manufacturers specializing in large engines have made it a rule not to sell them without starters, for the reason that if hand cranking is relied upon the owners soon meet with difficulty and in consequence rather heavy demands are made upon the service department.

Unfortunately the avidity with which marine engine manufacturers have taken to the starter is not an index of the good judgment shown by them in mounting the device. This was plainly evident at the recent motor boat show and the evidence is reproduced in this issue in the form of two pages of sketches of starter and generator mountings which one of our artists drew at the show. In most cases it is quite plain that these electrical machines were

not considered when the engines were first designed, but were after-thoughts.

Next to the flange mounting the clamp mounting is probably the best, as it permits of quick removal and replacement of the machine, and—if well worked out—holds it securely. At the present time not all marine engines fitted with electric starters have their flywheel enclosed, so the flange mounting is not universally applicable. However, the practice of enclosing the flywheel is gaining ground in marine practice and it can hardly be denied that a flywheel with a gear crown for starting should properly be enclosed. Generators also are best driven by enclosed gearing, even though marine engine men do not have to provide against road dust. Therefore, it is to be expected that the flange mounting will eventually also prove best for marine engines.

At present there are only two sizes listed by the S. A. E. for both starter and generator mountings, and these were worked out for automobile service. For marine work, in which low-speed engines up to several hundred horsepower output are used, the mountings have to be larger, and it is to be hoped that through co-operation between the marine engine division and the electrical equipment division of the Standards Committee, the list of standard mountings will be extended in the near future so as to cover the heavier marine practice.

Aerial Mail Service

EVERY one of the large nations hopes that after the war practical uses may be found for aircraft which may warrant keeping in operation at least some of its large works for aircraft production. Millions upon millions are being invested in buildings, machine tools and special equipment, and if all of this plant had to be liquidated at the end of the war the loss would be enormous. Consequently there has been a great deal of speculation as to possible commercial uses of aircraft, and several papers on the subject have been presented to British aeronautic bodies.

The chief attribute of the airplane being its speediness, its greatest possibilities seem to lie in the transportation of mail matter. Our fastest trains make only about 50 m.p.h. average over long distances, and this can be more than doubled by the airplane. The advantage of such fast mail service is very considerable to business, and would be especially appreciated in times like these when trains are oftener hours behind schedule than on time.

A serious attempt to introduce an aerial mail service between New York, Philadelphia and Washington will be made next summer, calls for bids for suitable machines having been issued by the Post Office Department. It appears from an announcement made by the Department that the practicability of the scheme will be fully determined before the service is really begun. This we take to mean that a considerable number of trips back and forth will be made with equivalent loads to determine the reliability of the machines and the competency of the operators before any regular mail will be carried. To

make the plan feasible, it was necessary for the War Department to release the necessary number of aero engines, but this was probably done gladly because anything tending to expedite the transaction of business between these important centers will facilitate the work of that Department.

Kerosene Carburetion

IT is quite apparent from the discussion at the recent Minneapolis S. A. E. section meeting that, although practically all modern farm tractors are being sold as kerosene-burning, they are far from burning this fuel satisfactorily in the service of farmers. Many tractor engineers (and perhaps also carburetor engineers) in the past have proceeded on the theory that a tractor engine works substantially under constant load, and though this assumption has some foundation in fact, there still is enough variation in the load to cause difficulties in the way of carburetion.

To effect vaporization of the kerosene in the exceedingly short period of time available for the operation, it must first be very finely divided by spraying. When kerosene thus finely divided is mixed with the proper proportion of air it will either remain in the liquid state, as a mist, or become gasified, according to the temperature and pressure of the mixture. High temperature favors gasification, as does low pressure. But both high temperature and low pressure mean a rarefied charge, low volumetric efficiency and small maximum horsepower from an engine of given dimensions. Thus it does not seem to matter much whether gasification of the fuel is induced by raising the temperature or by lowering the pressure of the charge as it enters the cylinder—the effect on the output is equally detrimental.

If the fuel is not finely divided by spraying but is emitted from the nozzle in relatively large drops, as will happen under a weak suction, then, of course, the difficulties of gasifying it are greatly enhanced. This is due to the fact that the rate at which heat can enter a globule of the fuel is proportional to the surface area of same, which latter varies at a lesser rate than the volume. Therefore, even though the temperature and pressure conditions in the cylinder during the suction stroke are such as to permit of the existence of dry gas, liquid fuel may still get into the cylinders if the spraying pressure is too low. If the fuel could be sprayed by means of compressed air or gas under a pressure of several atmospheres, controlled in proportion to the throttle opening, very fine division of the fuel could be insured under all conditions. This, however, would necessitate the shutting off, by automatic means, of either the nozzle or the air pressure upon the fuel whenever the suction ceased, and would entail serious complications.

The use of a well-regulated heat supply together with the most energetic spraying possible with the engine suction seems to be the simplest solution of the problem. The best method of heat supply and regulation remains an open question.

□ Latest News of the

Automotive Show Draws 178,270

Automotive Idea Triples Attendance at Twin Cities—
Tractors the Best Card

MINNEAPOLIS, Feb. 9.—After running seven days, the Twin Cities automotive show held in the large Overland storage building came to a successful close to-night with a total attendance for the week of 178,270 as compared with an attendance of 67,000 a year ago. The present figures entirely dispel any question as to the necessity of war shows, and they also indicate how desirable it is to have an automotive show; that it, one with cars, trucks, tractors and the thirty-two other applications of the internal combustion engine, which were on exhibition.

It was the broad automotive idea that was responsible for the unprecedented crowds, and undoubtedly next year the Twin Cities people will have a better representation of motorcycles and airplanes, as well as motor boats and small stationary gas engines, all of which fall within the automotive sphere.

During the middle of the week the greatest interest was in tractors and trucks, and the forty different tractor makers present did a good business. There were retail sales and many agencies were placed. One tractor maker admitted selling 70 per cent of his output through motor car dealers, or automotive dealers as they will soon be known. Several of the largest Minneapolis distributors have recently taken on tractor accounts and are planning a campaign with the 150,000 Minnesota farmers and the farmers of the Dakotas and Montana.

Estimates of show sales mean more at the Twin Cities show than they do at a Chicago or New York show, and reports of at least 200 tractors being sold give some indication of the interest. The fact that over 5000 dealers were registered by Thursday night was the best proof of the increased interest in the show. These dealers came from all parts of the four States that make up the 400,000 square miles of Twin City territory, an area that is roughly six times as large as the six New England States combined; an area larger than all of France or all of Germany. This area would accommodate all of our 104,000,000 people and the population per square mile would then be only about as dense as in the State of Massachusetts.

The truck show did not attract so generally as the tractor show, due perhaps to the greater novelty of the tractor.

Truck sales were made, but in relatively small numbers and these were confined to the Twin Cities. Various estimates have been made as to the value of car sales, figures going as high as \$1,000,000, but nothing definite can be computed further than that there were many retail sales and not a few dealer accounts closed.

The growing importance of the Twin Cities in automotive circles was emphasized by the Society of Automotive En-

(Continued on page 387)

Ford to Make Complete Liberty Engines

Packard Now in Production—Marmon and General Motors in 30-60 Days

WASHINGTON, Feb. 12.—The Ford Motor Co., Detroit, will be the largest single producer of Liberty airplane engines. Although the company has been producing only cylinders, under a new program the engines will be made complete. The Ford company has so perfected the processes of manufacturing cylinders that a saving of from 40 to 50 per cent in their cost has become possible. According to its contract with the government, the Ford company is entitled to but 25 per cent of the saving, the remainder going to the government.

It is understood that the Ford company will commence the production of complete engines this month. Already the Packard company is in production on 12-cylinder types. It is expected that the Nordyke & Marmon Co., Indianapolis, and the various General Motors Co. divisions will be in production in from 30 to 60 days.

Class AA Trucks Going to Washington

WASHINGTON, D. C., Feb. 12.—The four Class AA Quartermaster $\frac{3}{4}$ -ton war trucks assembled by the Willys-Overland Co., Reo Motor Car Co., Maxwell Motor Co., and Federal Motor Truck Co. are en route to Washington and will probably arrive here Thursday morning, Feb. 14. The trucks reached Pittsburgh last night and left there this morning for Chambersburg, Pa.

Eidlitz to Direct Housing of Labor

WASHINGTON, Feb. 12.—Otto Eidlitz, a New York architect, has been appointed Director of Housing by the Department of Labor. He will direct a huge program for housing labor other than that engaged on ship building. Congress has been asked for an appropriation of \$50,000,000 to carry on the work.

Tractor Makers Work at Capacity

Twin Cities Makers All Are
Rushed—Many Companies
Add to Their Plants

MINNEAPOLIS, Feb. 9.—Tractor makers in the Twin Cities are working at capacity and factories are being added to in order to speed up production as fast as building work can be pushed. Emerson-Brantingham is adding a stock warehouse, the steel framework of which is up. The company has 600 employees working exclusively on tractors and will produce approximately 3,000 machines this year. A new engine testing room with eleven engine test stands is being fitted up. In this test the engines will be run with their complete tractor equipment including radiators.

The Minneapolis Steel and Machinery Co. which manufactures the Twin City tractor has just completed a new testing laboratory fitted with a 100-hp. Sprague electric testing dynamometer. There are two testing stands one at each end of the Sprague unit so as to admit of having two engines worked on, one under test and the other being prepared for test or otherwise used as needed. The Sprague unit is made for 100-hp. at 500 r.p.m. and will serve for high speed work up to 2,000 r.p.m. The new building is a brick structure, with tile floor and fitted with all modern conveniences.

The Gray Tractor Co., busy with export orders has already shipped 160 tractors to France, has forty more awaiting shipment and a large order yet to complete. The company is assembling two machines per day at present.

The Wilcox-Bennett Carburetor Co. maker of kerosene carburetors and the Bennett air cleaner for tractors and trucks is busy on both of these devices.

Mobilize Schools to Train Soldiers

WASHINGTON, Feb. 12.—Secretary of War Baker has organized a committee to mobilize the various schools and colleges of the country, including automobile schools to give technical training to soldiers. It is estimated that 100,000 soldiers will be trained in these schools in the next 6 months. The committee is composed of: Col. Hugh S. Johnson; Lieut.-Col. Robert Rees; Major Grenville Clark; Dr. Charles R. Mann, Massachusetts Institute of Technology; Dr. James R. Angell, dean of the faculty of the Western Electric Co.; J. P. Monroe, Boston, and Dr. Samuel Capen, Washington.

Automotive Industries



Airplane Mail Route Planned

Government Wants Round Trip a Day Between Washington, Philadelphia, New York

WASHINGTON, Feb. 12—An airplane mail service between Washington, Philadelphia and New York with a schedule of a round trip per day will soon be in operation, according to plans made public to-day by Postmaster-General Burleson.

The Post Office has asked for bids for construction and provision of the five airplanes to be used in the establishment of an air route for delivery of first-class mail. It is expected the service will be greatly increased later.

The War Department has arranged to release a sufficient number of Hispano-Suiza 150-hp. engines to equip the planes. Bids will be open Feb. 21 and the contract will be awarded to the bidder whose machines meet the service tests of the War and Navy Departments.

The airplanes and parts are to be delivered at such points in Washington, Philadelphia and New York as the Post Office designates not later than April 25. The contractor will also be required to furnish in addition to the five planes a sufficient stock of spare parts and to

have in reserve a sixth airplane. He must detail to the Post Office Department a supervisor for 3 months to try out the aviators and mechanics in the operation of the planes.

Stipulations include that the machines must be capable of carrying 300 lb. of mail matter a distance not less than 200 miles without stop, maximum speed of 100 m.p.h., minimum of 45 m.p.h., and climbing speed of 6000 ft. in 10 minutes.

The Government will make a special postage rate not exceeding 25 cents per ounce for the transmission of mail by the air route, and will guarantee to observe a regular time schedule.

Congress has already made an appropriation of \$100,000 for preliminary steps establishing airplane postal service.

Postmaster-General Burleson states that once the scheme is established it will remain a permanent service.

Favor Daylight Saving Bill

WASHINGTON, D. C., Feb. 11—The daylight saving bill was given a favorable report by the House Interstate Commerce Committee Saturday. The bill has already passed the Senate and it is expected to find no opposition in the House. As amended, it makes daylight saving effective from March 30 to Oct. 30, during which period an extra hour of daylight will be obtained by turning the clock back one hour.

Farm Tractors Follow Automobile Design

Kansas City Show Reveals Reduction in Weight and Inclosure of Parts

KANSAS CITY, Feb. 12—The third annual farm tractor show opened here to-day with forty different makes of tractors, exhibited in a special one-story frame building erected for the purpose and which is a great improvement on the tent used for the last 2 years.

The present show is one of the largest tractor exhibits ever staged in this country and while the majority of the leading makers are represented there are several important makers not here.

The exhibit shows a very great change in design in the last year, the two most notable lines of improvement being:

- 1—Reduction in weight and,
- 2—Inclosing of parts to protect them from water and dust.

The influence of automobile design is plainly seen in many new models and in improvements on old models. There is shown a new Trojan tractor which might be designated as the first tractor built with a live rear axle design and with all parts as completely inclosed and in which use is made of 60-in. rear driving wheels yet without pressure on the teeth of the gears higher.

Tendency Toward Four Wheels

In a word what was declared a year or two ago as the impossible in tractor design has been accomplished. In this Trojan tractor is used the Foote gearset and rear axle and rear wheel design, and as the Foote company manufactures parts for all concerns wishing to buy them there will not be any restrictions on the new design shown here for the first time.

There is a very marked tendency toward the use of four wheels instead of three, and the single front wheel in tractors is almost at an end. It is rumored that some of the important concerns using the single front wheel have new designs in which two front wheels for steering are used. There is also a notable tendency toward the use of larger diameter front wheels for steering.

The reduction of weight is very apparent in not a few models. One concern which has a new model which is not shown here has succeeded in cutting 2200 lb. out of its tractor which has largely been done by a new design of gearset in which forged gears are used and by improving the design of the rear wheels and both axles. The weight has not been

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Washington News Letter

Transportation Under One Head—No Word on Fuel—Rubber Exports Licensed—War Department Reorganized

WASHINGTON, D. C., Feb. 11—Washington is seething this week with undercurrents reported to include radical changes in handling of army trucks, considerable discord between individuals and companies in the industry, and rumors that imports and exports will be subject to regulation. There is also an undercurrent pertaining to fuel as regards the industry and which carries reports of personal interest and internal difficulties.

As has been told frequently, the truck business of the army now is more or less chaotic. The standardized war trucks of the Quartermaster Corps, really the army war trucks, have not been taken up by all departments, with a result that there are numerous makes of trucks, and various other so-called standardized trucks with the attendant confusion.

Complaints this week have been re-

ceived from tire makers who point out that there is no standardization of tire sizes; for example that the 1½-ton signal corps truck carries a tire that does not correspond in size with the standardized A truck. In addition there have been complaints of duplication of effort created by the separate truck divisions.

A fairly substantial report this week is to the effect that all of the motor transportation work of the army, including design, procurement and maintenance, will be first under one head. The report has it that the head of this work will be an automobile man working as a civilian under a high army officer.

It is quite likely that Christian Girl, chairman of the motor truck section of the Quartermaster Corps and president of the Standard Parts Co., Cleveland, will

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Kerosene Burning Problem Discussed

Heat Supply Must Be Regulated to Maintain the Volumetric Efficiency

MINNEAPOLIS, Feb. 9—That the ordinary hotspot manifold or double manifold does not fully solve the problem of burning kerosene in tractor engines was the consensus of opinion among engineers attending the regular monthly meeting of the Minneapolis Section of the S. A. E. held here on Wednesday evening and concerning which a short report appeared in *AUTOMOTIVE INDUSTRIES*.

Professor Mowry of the State Agricultural College took the stand that the increased use of kerosene and heavier fuels is more dependent on engine designers than on carbureter or manifold makers. A questionnaire addressed to 400 tractor owners in Minnesota brought out that none of them was using distillate or motor spirit in his machine. The majority replied that they used kerosene, less than 12 per cent using gasoline, except for starting. That many of these owners are not satisfied with the performance of their machines on kerosene was indicated by the fact that only 40 per cent of them agreed that they would recommend tractors to their neighbors. This was apparently not due to the cost of maintenance, because Professor Mowry showed figures in which the average maintenance or repair cost for 200 tractors in the state, all of which were less than 3 years old, was \$28.05 per tractor, an unexpectedly low figure. No figures were given to show the average number of days these machines worked per year.

University Tests

Professor Mowry quoted figures from tests made by his university on kerosene fuel with hotspot manifolds. The tests were made with a four-cylinder, L-head engine with a removable head and the duration of the tests was 1 hr. Water temperatures ranged from 190 to 212 deg.

The test with the Clapper manifold was made at an engine speed of 750 r.p.m. and the dilution of the crankcase oil due to kerosene cutting the oil film on the cylinder walls and getting past the piston into the crankcase was 0.1 lb.

With the Holley vaporizer the engine was run at 850 r.p.m. to get the same horsepower and the crankcase dilution was 0.7 lb.

With the Duplex manifold an engine speed of 820 r.p.m. was necessary to give the power and the crankcase dilution was 0.3 lb.

In some manifold tests the engine did not run the 1 hr., but stopped after 35 min. due to pre-ignition.

W. G. Clark, engineer of the Wilcox-Bennett Carbureter Co., maker of the Bennett kerosene carbureter, and who has just returned from a 3-months investigation trip among tractor farmers from Texas to Montana, in opening the discussion declared that the situation

with the farmer so far as burning kerosene in tractors is concerned is much more serious than tractor makers generally imagine, due to tractor makers selling tractors that are supposed to burn kerosene satisfactorily but which fail to do it in the service of the farmers. As a result farmers in many sections are beginning to look with disfavor on kerosene as a tractor fuel.

Mr. Clark held that tractor makers are apt to rely too much on laboratory testing and experimentation methods, rather than getting out into the field. He claimed that the hotspot manifold is not the solution of the kerosene problem, because it increases the temperature of the mixture too much and cuts down the volumetric efficiency of the engine so that from 25 to 30 per cent of the engine power is lost.

Farmers Complain

He cited examples of farmers complaining to tractor makers that their tractors would not handle kerosene although advertised to do so, and quoted letters in which these tractor makers practically admitted that they would not, by recommending to the farmer that he use gasoline instead.

Spark plugs are giving very satisfactory service, Mr. Clark citing cases where plugs had been used for 2½ years in a tractor without changing.

With regard to lubricating oil the consensus of opinion of those engineers present was that the lubricating oil that is best for the burning of gasoline is best for kerosene, and that where very heavy oils are used with kerosene it is just that they will withstand the action of unburned kerosene a little longer and so postpone the dilution of the crankcase oil. Oils with good viscosity were recommended.

E. R. Greer, engineer of the Emerson-Brantingham company, thinks that the hotspot manifold to accomplish its object must have some form of heat control. Consideration must be given to the speed of travel of the mixture in the manifold as well as the temperature of the manifold. When there are high gas speeds with open throttle less heat is needed; in fact, you want to get the gases in as cool as possible in order to keep your power up; but when the throttle is closed on light loads and the manifold gas speed is cut down you must have added heat to prevent loading up.

More Power for Automobile Industries Committee

WASHINGTON, Feb. 9—Directors of the Motor and Accessories Manufacturers Assn. met in Washington last week to discuss means of enlarging and broadening the scope of the Automobile Industries Committee. No definite decisions were reached and a second meet-

ing is to be held Thursday, Feb. 14, in New York, which will be attended jointly by directors of the Motor and Accessories Manufacturers Assn. and the National Automobile Chamber of Commerce. The Automobile Industries Committee believes that its functions can be more efficiently handled and its results greatly augmented by the addition of efficiency experts, plant surveyors and production men to its present organization. This is one of the matters being handled by the directors of the M. & A. M. A. at the present meetings.

No Fuel Restrictions on St. Louis Show

ST. LOUIS, Feb. 11—Fuel restrictions have been withdrawn from the St. Louis Automobile Show, to be held in the Exhibit Bldg., Feb. 18-23. The 30,000 sq. ft. of floorspace required were allotted last week to dealers, and preparations for the opening are going forward rapidly.

Jordan to Add \$200,000 Capital

CLEVELAND, Feb. 13—A 50 per cent increase in the production of Jordan cars, made possible by a largely increased demand and the immediate acquisition of \$200,000 additional capital, and the placing of Jordan stock on a definite dividend-paying basis, is part of a plan announced after a meeting of the board of directors following the annual stockholders' meeting held last week.

Jordan has, during the past year, done a business of approximately \$3,000,000 on a working capital of \$300,000 producing and selling more than 2000 Jordan cars.

In the last quarter of 1917 Jordan earnings amounted to 16.7 per cent on the capital, which is equivalent to 66.8 per cent for the year.

The expense incident to starting a new business, putting a new car on the market, and establishing Jordan reputation has now been absorbed, and the earnings as shown by the last quarterly statement have been satisfactory.

The new plan provides for the sale of \$200,000 of preferred stock now in the treasury, with one-half share of common stock given as a bonus with each share of preferred. This stock would be fully paid and non-assessable. The preferred stock now held by the original stockholders, together with the new preferred issue, will be placed on a 7 per cent annual dividend basis, to be paid quarterly. The new issue will first be formally offered to the present stockholders who may subscribe pro-rata to their present holdings. In the event that the new issue is not all taken by them it will then be available to new subscribers. The control of the Jordan company remains in the hands of Mr. Jordan and his working associates.

Strikes Reduce Copper Output

WASHINGTON, D. C., Feb. 11—The Mediation Committee appointed last spring by President Wilson, states in a report that the strikes during the summer in Arizona resulted in a loss of one hundred million pounds of copper.

England Restricts Use of Gas

Substitute Motor Fuel Is Limited to Owners, Who May Also Use Gasoline

LONDON, Jan. 9—By a new order issued to-day, the use of gas for motor cars and trucks has been limited to those cases where it is legal to use gasoline as a motor fuel. This ruling represents another curtailment on the industry. It was thought that coal gas might be used since it allowed the conservation of gasoline, but the government has apparently decided to restrict the use of automobiles, irrespective of the fuel used.

On Feb. 9, a still further curtailment order is expected to go in force. On that date a motorist must decide whether he will use coal gas or gasoline as a fuel. In other words, after Feb. 9, if your permit allows you to use gasoline, then you cannot use coal gas and vice versa.

This new ruling suggests a possible development in automobile fuels which will continue after the war. There are some sections of the country in which the use of gasoline may cease entirely, particularly those where gas is plentiful, such as bituminous coal mining areas. There the voluminous gas bag will undoubtedly disappear and the steel cylinder take its place. With the use of steel cylinders and compressors, coal gas will be carried more easily than gasoline, and in such sections, coal gas may supersede gasoline as a fuel. It is not likely that the gas bag will disappear during the period of the war, due to the difficulty of securing steel cylinders.

Another aspect to the post-war fuel situation in England is the possibility of using benzol. There will be gigantic supplies of benzol when the war is over, because the huge plants which have been put up to produce this satisfactory fuel are now doing war work only, but afterward it should sell at a lower price than gasoline.

Standard Parts Holds Midwinter Meeting

CLEVELAND, Feb. 11—Increased output and standardization were the principal subjects discussed at the midwinter meeting of plant and production managers of the Standard Parts Co., held in the Hotel Statler, Feb. 4 and 5. In order to prevent delay or cancellation of orders for the goods which were damaged in the fire at the Cincinnati plant, it was decided to divert this work to other plants of the company, and likewise to transfer the Cincinnati workmen to other factories for the time being.

Company executives and managers of other departments joined the production men at the midwinter dinner. Addresses were made by Christian Girl, president of the Standard Parts Co.; E. J. Hess, vice-president; T. E. Borton, treasurer; P. A. Connolly, secretary; Dan C. Swander, sales director; W. C. Keys, acting engineering director; and

H. H. Newsom, director of purchases. W. E. Perrine, director of production, presided.

Overland-Curtiss Union Increases Engine Output

BUFFALO, Feb. 11—A large output of engines for training planes is the result of the close manufacturing union of the Willys-Overland Co. and Curtiss Aeroplane & Motors Corp. The January output of Curtiss engines by the Willys-Overland company was 110, and in addition the Buffalo and Hammondsport Curtiss plants turned out 400, making a total well in excess of 500.

At present Willys-Overland is turning out more than 15 engines of the OX type daily, and when the Elyria (Ohio) plant, which has hitherto been devoted to the manufacture of Knight engines, swings into production about the middle of February, the total will be greatly augmented.

Under the expanded manufacturing schedules the Overland and Curtiss plants should produce jointly in February between 750 and 800 engines. Within 60 days it is expected that they will reach a stride of 1000 a month.

Detroit Has 118,489 Industrial Employees

DETROIT, Feb. 13—According to the report by the Michigan Labor Commission, the automobile industry employs practically 50 per cent of the industrial employees in the six largest Michigan cities. Detroit, alone, employees, 118,489; Flint, 18,262; Lansing, 7875; Jackson, 4683; Muskegon, 2847; Pontiac, 5747.

Loans Urged for Tractors

COLUMBUS, OHIO, Feb. 11—That farmers who want to purchase tractors should be given preference in loans was urged upon all Ohio bankers by Philip Berg, state superintendent of banks. He says that large crops are a war necessity, and that "worthy farmers should have the fullest line of credit, consistent with good banking principles, for the purchase of farm tractors."

Government Requests Airplane Device Ideas

WASHINGTON, Feb. 11—The National Advisory Committee for Aeronautics has invited all inventors of airplanes or airplane equipment to submit their ideas. A comprehensive outline of the proposed device, with necessary data, and the results of any tests that have been made, should be sent to the committee. All suggestions of inventions will be considered confidential, and those of merit will be turned over to the proper officials, with suitable recommendation. A special sub-committee has been formed to examine these inventions, and it is suggested that inventors obtain scientific and technical advice before taking the time of the government for ideas which violate scientific laws or are contrary to the best aeronautic practice.

Ford Starts Work on Sub-Chasers

Keel of First Boat Already Laid—Side Frames Ready to Go Up—Designed in 10 Days

WASHINGTON, Feb. 9—Henry Ford laid the keel for the first of the new type patrol boats to be built in the Ford plant yesterday. The side frames are ready to go up.

Secretary Daniels made public to-day a number of details regarding the Ford contract. In December, Henry Ford offered, by letter, to build naval vessels in his plant. A few hours after the letter was received a telegram was sent requesting Mr. Ford to come to Washington for conference. A few days later Mr. Ford and his staff went into consultation with officials of the navy, following which the Ford party went to Philadelphia to inspect shipyards and plants. They returned to Washington for further consultation, and on Dec. 31 had the preliminary plans and specifications of the boats to be built. Several days later complete plans were delivered to Ford, who on Jan. 15 telegraphed his proposition to Secretary Daniels, and in return received a contract for a large number of the boats. Rear Admiral C. W. Dyson representing the Bureau of Steam Engineering, and Naval Constructor Robert Stocker, representing the Bureau of Construction and Repair, are in Detroit assisting Mr. Ford.

The Ford company, according to Secretary Daniels, is pushing construction at a rate that will probably exceed all previous records for building steel naval vessels.

The new type of patrol boats being built by Mr. Ford was designed in ten days. A model was made and tested at the Washington navy yard before the placing of contracts.

Goodyear Must Pay \$750,000 Tax

COLUMBUS, OHIO, Feb. 11—The Goodyear Tire & Rubber Co., Akron, must pay the Willis tax of 3/20 of 1 per cent on its \$50,000,000 increase of capital, a total tax of \$750,000. This decision was made by Attorney-General Joseph McGhee, who ruled that when a corporation files an increase of capital within 6 months prior to the time of filing the annual report, that part of the increase which is subscribed, or issued or outstanding at the time the report is filed, must be taken into consideration in computing the franchise tax.

Marshall Vice-President of Jones

WICHITA, KAN., Feb. 11—Deering J. Marshall has been elected vice-president of the Jones Motor Car Co., and John Engstrom has been made a new director to fill the place of J. W. Farmer, resigned.

Chicago to New York Truck Line

Master Truck Transportation
Co. to Operate Motor Freight
Fleets on Schedule

CHICAGO, Feb. 12—Details of the arrangements for the Chicago and New York truck service of the Master Truck Transportation Co. indicate very thorough preparation for maintaining the movement of truck trains on schedule. As previously reported, this new service is to operate a freight line between Chicago, Buffalo and New York, and the first fleet of 24 2-ton Master trucks is expected to be ready for the pioneer trip as soon as the weather conditions permit. Some idea of the thoroughness of the preparations will be gained from the fact that the fleet will have with it one truck devoted entirely to carrying oil and gasoline for the convoy, another is equipped as a kitchen to prepare meals for the drivers and mechanics en route, while a third will carry tents and sleeping equipment for the men. It is designed to eliminate the necessity for depending upon any hotel or restaurant accommodations.

According to General Manager Goldman, this method of freight transportation will be sufficiently popular for it to become general with other truck concerns, as already the new company just formed has had requests from more Chicago and New York manufacturers to make deliveries between the two points than a fleet three times the size could handle.

All of the hauling will be done under contract, and there will be no "less-than-truckload" shipments taken. Further, these full loads must all go to one destination. There will be no intermediate stations for the present, shipments being taken only for Buffalo and New York delivery at first. Officials announce that contracts have been signed to insure full loads for the trucks for the return trip.

The trucks will run in convoy formation, and 10 or 11 hrs. will constitute a day's run. The drivers that start with the trucks will continue with them throughout the trip. The character of the freight to be handled will include everything that moves by a truck of this capacity.

Rates for hauling will be the same as for express, but there will be the added feature that the power that carries the shipment across the country will deliver it at the door of the consignee. Present plans do not include way stations for concentrating freight or for unloading for further distribution. By handling all this business under contract there will be no necessity for interstate commerce regulations.

One feature of the truck will be a pneumatic tire equipment, with the use of which a speed of 25 to 30 m.p.h. is anticipated. Special changes in construction to permit of this speed have been made. In addition to the 2-ton in-

ternal gear drive there will be also probably some 3½-ton worm-drive trucks in service. All will have special bodies of the stake type, with tarpaulin covers, the loading capacity being 12 by 6 by 6 feet.

California to Have Tractor Demonstration

DAVIS, CAL., Feb. 13—A tractor demonstration will be held on the University of California Farm, April 17, 18 and 19 under the auspices of the California Tractor and Implement Assn. This association was formed by tractor manufacturers and their representatives for the purpose of conducting such a demonstration.

A special effort will be made to show the broad scope of modern power-farming and the versatility of the modern tractor. There will be a complete showing of tractor tools, including plows, discs and drag harrows, cultivators, sub-soilers, scrapers and checkers.

Practically every make of tractor sold on the Pacific Coast will be shown. These include the Holt, Yuba, Best Tracklayer, Waterloo Boy, Cleveland, Samson, International, Avery, Case, Monarch, Bean, Moline, Wallis, Fageol, and Sandusky. Implement lines will be exhibited by the John Deere Plow Co., Oliver Plow Co., Pacific Implement Co., Baker & Hamilton, I. H. C., Moline Plow, Case, Avery, Holt, and Yuba.

The use of the tractor as a stationary power plant will also be demonstrated, and tests will be conducted as to actual drawbar horsepower and short-turning ability in plowed ground as well as on ordinary surfaces. Tests will be under the direction of Professor Davidson of the University of California.

The demonstration committee in charge of the show is composed of W. H. Gardner, Yuba Co., chairman; W. E. Price, Pacific Implement Co.; W. D. Boswell, distributor, and Prof. J. B. Davidson. Eugene Smith will manage the demonstration.

Washington-New York Truck Line

WASHINGTON, D. C., Feb. 11—The Liggett-Riker-Hegeman Drug stores have inaugurated a truck schedule between New York and Washington to overcome the uncertainties of rail shipments. A 6½-ton Packard is used and it is expected that with clear weather conditions the 300-mile journey can be made in 2½ days.

Detroit-Cleveland Truck Route Ready

DETROIT, Feb. 11—The local traffic department of the Board of Commerce has received a letter from the Highway Motor Transport Co. of Cleveland, asking for 500 tons of Detroit commodities to carry to Cleveland as soon as possible. The company has already 500 tons of Cleveland goods awaiting truck transport to Detroit. It is planned to operate these trucks in trains of from eight to twelve each, each truck being capable of carrying 6½ tons. The rate from Detroit to Cleveland will be \$1.35 per hundred, and the trip each way will take not longer than 3 days.

Link Mid-West Cities by Truck

Detroit, Cincinnati, Cleveland,
Toledo and Chicago to Be
Regularly Served

DETROIT, Feb. 11—Detroit, Cincinnati, Cleveland, Toledo and Chicago will be connected by an inter-city motor truck line within 60 days if plans now under way mature.

A Toledo concern known as the National Motor Transport Co. is planning to put 50 trucks into operation in 2 months, and as soon as these are in successful operation to add 100 more. It is expected that 150 trucks will be on the road in 90 days. F. V. McCormick of Detroit is in Toledo organizing the company. It is stated that 25 men, most of whom are Toledo business men, are interested, and it is expected to incorporate soon for \$1,500,000.

The routes between the four cities have been mapped out and test trucks have been sent over the roads that show that fast time can be made. According to tentative schedules, the distance from Toledo to Detroit will be covered in 6 hours; from Toledo to Cleveland in 12 hours; Toledo to Cincinnati in 18 hours; and Toledo to Chicago in 24 hours.

The truck equipment will be decided upon as soon as the board of directors is organized. Traffic Commissioner H. G. Wilson of the Toledo Commerce Club has taken the matter up with the Interstate Commerce Commission and has been assured that charges made by the truck company will not be interfered with, at least until after the war, as the government favors the establishment of such transport companies now to relieve railway congestion. The same assurance has been given by the Ohio Public Utilities Commission. It is planned to run the trucks in trains of five each, and it may be that branch lines will be established along the routes later. All kinds of parcels, express and freight will be carried.

Indianapolis-Chicago Line

INDIANAPOLIS, IND., Feb. 9—Racklind & Farber, produce merchants of Indianapolis and Chicago, have inaugurated a motor freight line between the two cities. The run is 186 miles, and recently a Maxwell truck loaded with 23,000 lb. of perishable freight went through in 18 hours.

Producing 60 Ford Tractors a Day

DEARBORN, MICH., Feb. 11—Henry Ford & Son are completing the order of 7000 tractors for the British Government and are now turning these tractors out at the rate of 60 per day. Six thousand of these tractors are completely assembled, while the other 1000 are made in service parts. Production is still being stepped up, and it is predicted that the output will probably reach seventy-five a day during the coming summer.

To Make Essex at Hudson Plant

Preliminary Work of Getting New Car in Production Now Going On

DETROIT, Feb. 13—The Essex car, which will be produced by a concern headed by W. J. McAnenny, vice-president of the Hudson Motor Car Co., will be manufactured in the Hudson plant. The car was to have been built in the old Studebaker plant No. 5, which was bought for the purpose, but this was leased out for war work. Meantime, the preliminary work of getting the Essex car into production is going forward at the Hudson plant. Nothing definite regarding the entrance of the Essex into the commercial field nor any details of its specifications can be announced at present. Plans for going ahead with the production are being formulated, and extensive tests are being given to the car in its experimental form.

AA Trucks Reach Washington

WASHINGTON, Feb. 13—The four sample $\frac{3}{4}$ -ton Quartermaster trucks, Class AA, arrived in Washington last night, making the journey in less than four days from their respective factories. The trips were made without any serious mechanical troubles. The average speed was 18 miles per hour and the gasoline consumption 10 miles per gallon.

Dahlquist and Finkenshtadt Promoted

WASHINGTON, Feb. 13—Captain Charles S. Dahlquist, formerly engineer for the Timken-Detroit Axle Co. and now in charge of axle inspection for the Motor Transport Section of the Quartermaster Corps, has been promoted to be a major. Second Lieutenant Rudolph Finkenshtadt, formerly assistant to Christian Girl of the Standard Parts Co., Cleveland, now assisting Girl in the Motor Transport Section of the Quartermaster Corps, has been promoted to the rank of captain.

Labor Shortage a Myth

WASHINGTON, Feb. 13—In direct contradiction to the cry of labor shortage and the threat of labor conscription, Secretary of Labor William B. Wilson states to-day: "The immediate labor needs of the shipyards are filled and the man who leaves his present position to seek employment in shipyards is likely to find no work. The coming month, however, will necessitate an increase in the present number of shipyard workers by several hundred thousand men who have had experience in trades used in shipbuilding.

"The Department of Labor is now enrolling men of these trades through its United States Public Reserve who are willing to go to shipyards when they are advised. The shipyard volunteers will

be placed through the Department of Labor when it has full details as to when and where the men are needed, the wages and housing and other conditions.

"We appeal to all qualified men to enroll during the coming week in the reserve and to stick to their present jobs until they are called."

To Cut Ford Car Production 50 Per Cent

DETROIT, Feb. 14—Reports that the Ford Motor Co. will abandon the manufacture of passenger cars are denied by factory officials. The Ford plant will be largely devoted to war work on airplane and submarine destroyer parts, with the result that passenger car production will be cut about 50 per cent. At present, the normal output of the factory is about 3000 cars daily. A reduction of 50 per cent would bring this to 1500 cars a day.

The Ford company is behind with its orders in practically every section of the country, and the resulting cut in production will naturally cause a country-wide shortage of Ford cars, as soon as available supplies in branch plants are used up. Ford dealers have been urging prospects to place orders early in order to take care of the demand.

American Machinery Plant for Shells

DETROIT, Feb. 14—The American Machines Corp., Port Huron, Mich., a munitions manufacturing company subsidiary to the American Canadian Resources Co., has purchased the American Machinery plant. Men have already been put to work on a \$500,000 government contract for the manufacture of shells.

The American Machines Corp. is controlled entirely by outside capital, and the machinery and plant were purchased outright. The plant of the American Machinery Co. is fully equipped for the manufacture of shells as it was recently engaged in making shells for the Russian government. It is expected that 300 men will be employed and the factory run on a 24-hr. basis in a short time.

65,000 Hercules Engines for Allies

CANTON, OHIO, Feb. 13—The Hercules Motor Mfg. Co. has started work on a contract placed by Henry Ford & Son, Dearborn, Mich., for 65,000 farm tractor engines for use in the allied countries. Additional workmen are being employed, and full capacity and facilities utilized for this work. Extensive repairs are being made in the plant to speed up production, and it is expected that more than 100 engines will be produced daily. These will be shipped to Cork, Ireland, where Henry Ford & Son have an assembly plant.

\$500,000 to Transport Labor

WASHINGTON, D. C., Feb. 12—The Department of Labor has asked Congress for \$500,000 to be used for transporting workers about the country. An appropriation for \$50,000,000 for housing and transportation will be asked in the near future.

Stettinius to Push War Work

Purchases Surveyor Will Maintain Even Flow of Production—Pierce for Priorities

WASHINGTON, Feb. 12—In making plain the exact functions of Edward R. Stettinius of New York, who has recently been appointed Surveyor of Purchases and Supplies, the War Department has indicated that Stettinius is "associated with and subordinate to Brig.-Gen. Palmer E. Pierce," who will have supervisory charge of all purchases made by the several purchasing bureaus of the War Department.

The function of Mr. Stettinius will be largely that of surveyor of the industrial field and an accelerator of war supplies. In other words, he will be largely instrumental in maintaining an even flow of production to the purchasing agencies of the War Department. He is to keep track of the capacity and production of contractors and will pass along orders for changes in the requirements of the American expeditionary forces to harmonize production with demand. General Pierce will determine priorities and make estimates of requirements, but will not take over the routine purchasing activities of the various bureaus which will be continued as heretofore.

Quartermaster General George W. Goethals has been given additional duties. He will act also as director of storage and traffic as well as quartermaster general. Among other things he will direct priorities of storage and war traffic in the United States, the embarkation of supplies and troops, inland war transportation and storage at inland points, embarkation points and overseas points.

All Aviation Training in U. S. Now

WASHINGTON, D. C., Feb. 12—The demands of France for American soldiers to be given advance training in the French aviation schools have been met and all advance training in France is now filled up. Hence all of the American soldiers enlisted in the flying service are being given their advance training in this country.

It is considered likely, however, that France will ask for more men to train as soon as the several thousand now undergoing flying instruction in France have completed their courses. At this time we will again send aspirants for aviation service abroad for their advance training.

Heatless Mondays Abolished

WASHINGTON, Feb. 12—Fuel Administrator Dr. Harry Garfield has formally abolished heatless Mondays. He has stipulated, however, that certain State fuel administrators have discretion to take steps similar to the heatless order when deemed imperative.

Highway Trunk Lines for England

To Be Built on Straight-Line Principle and Pass Large Towns at Easy Distance

LONDON, Jan. 9—England is already seriously considering the development of a line of motor highways laid out largely on the principle of trunk railroad lines, which would be used exclusively for motor transportation, and built with the object of opening up cheap land transportation and connecting the large market centers.

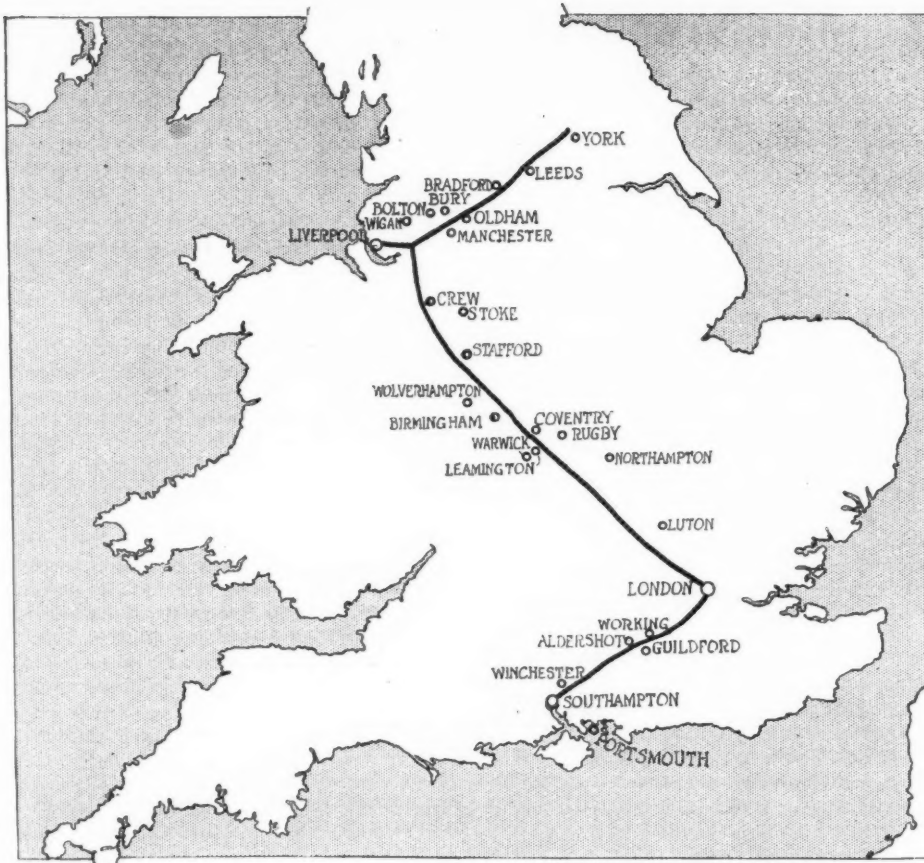
This new system of roads, according to plans, would be built on the straight line principle and would not enter large towns, but rather pass them at easy distances. The roads would be as straight as possible, 150 ft. wide, with double driveways, and only one direction traffic on each. It is not the purpose of these roads to increase in size the already large towns, but to provide good transport facilities through the country. They will also reduce the congestion of large towns by providing cheap lands on which trades which cannot be profitably carried on in town may be developed. Factories would spring up alongside these roads just as they have followed railroads and waterways in the past. Opportunities for town and city planning would be provided, and also cheap land for homes in connection with those industries developed.

Factories Served by Motor Vehicles

Factories and buildings in connection with these new roads would rely entirely on motor vehicles for transportation, and delivery of merchandise to the retailer, the consumer or the ports for export trade. Trans-shipment would thus be eliminated and congestion of railroads greatly reduced.

No definite scheme for the entire country has been worked out, but undoubtedly there would be one main road from London to the great southern export port of Southampton. There would be a road leading north from London to Manchester and Liverpool, and others to the northern manufacturing cities such as Leeds, Bradford and York.

That such a system of roads would be of great military value has been proven by the value of those in France. These



According to plans, England's highway system will run directly from Portsmouth to the northern manufacturing area. No attempt is made to have the road pass through the large towns

new roads would be laid out without regard for existing highways, but an existing highway, coinciding with the planned road, would be incorporated into the scheme.

A road system of this nature would thread all of the great manufacturing and producing districts. The building of such a highway system would follow as one of the after-war developments of the country, and the work of construction would absorb practically all the surplus labor of the nation.

England Restricts Tractor Importation

LONDON, Jan. 9—On account of increasing freight difficulties, the importation of farm tractors is being materially reduced, and it is understood that no permits will be given for the importation of tractors excepting where the individual importer can show that he has

already sold a reasonable percentage of the number he wants to import. Heretofore the importation of tractors has been encouraged and the present action indicates that the government plans to restrict tractor importation as carefully as that of motor trucks.

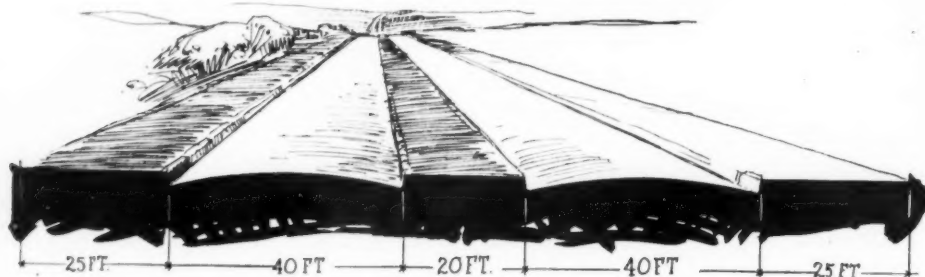
December Oil Output Slightly Decreased

WASHINGTON, Feb. 11—The December output of oil was 19,807,143 barrels, as compared with 20,492,712 in November. The decrease is due to the lessened output of the oil fields north and east of Oklahoma, where the weather was coldest. In all other fields the output showed a fair increase.

The reserve oil stocks were requisitioned in December in all fields except the Appalachian and Rocky Mountain districts, where moderate additions to stocks were made. Except in the Oklahoma-Kansas field, the surface reserve of crude oil at the end of 1917 was appreciably less than at the end of 1916.

477 St. Louis Automobile Men in Service

ST. LOUIS, Feb. 11—A canvass of the motor trade here shows that 477 men have gone from the industry into military and naval service. The Dorris Motor Car Co. alone sent 158 men, many of them enlisting as repair men and drivers. Other figures are: Ford Motor Co. (St. Louis branch), 53; Chevrolet Co., 25; Overland Co., 18; Hudson-Phillips and Cadillac companies, 15 each.



Cross-section of planned highways, showing double driveways, with one-direction traffic on each. The total width of the road is 150 ft.

United States Rubber to Change Laws

Amendments Approved by Board of Directors to Be Submitted to Stockholders Mar. 19

NEW YORK, Feb. 11—The United States Rubber Co. will submit several amendments to the by-laws for consideration of the stockholders at the annual meeting on March 19. These have already been approved by the directors.

First, it is proposed to change the date of the annual meeting from the third Tuesday in March to the corresponding day in April, and the hour from 12:30 to 11:30 a.m. The second amendment, if adopted, will increase the number of directors from 21 to 25. The third provides for the optional election of a chairman and vice-chairman of the board of directors and a controller of the company. These offices do not exist at present, and it is understood that even if the amendment is adopted, they will not be filled in the near future. This amendment also provides that the vice-presidents need not be directors.

The chairman of the board of directors will have greater powers, according to the fourth amendment. He will be the chief executive officer of the company, subject to the board, and shall be in general charge of the affairs of the company. He will preside at all meetings of the stockholders and board, and be chairman of the executive committee. The directors, at their discretion, may elect a vice-chairman, who is to perform those duties prescribed by the executive committee, the directors or the chairman of the board.

If a chairman is not elected, the president, subject to the directors, the executive committee and the chairman of the board, will have general charge of the business of the company relating to purchasing, selling and general operation.

The seventh amendment provides that the treasurer, jointly with the president or one of the vice-presidents, shall have custody of the securities belonging to the company. The controller is to be the principal officer in charge of accounts.

Proxies for the annual meeting on March 19 are being asked for in the names of Samuel P. Colt, James B. Ford, Lester Leland, Walter S. Ballou, Nicholas F. Brady and Charles B. Segar, who comprise the executive committee.

Maxwell Truck Ends Endurance Run

NEW YORK, Feb. 11—The Maxwell truck which left New York Dec. 1 on an endurance and demonstration run has reached its destination at Washington after covering 2488 miles by way of Philadelphia, Washington, Richmond, Atlanta, Ga., to Jacksonville, Fla., and return through Savannah, Augusta, Columbia, S. C., Raleigh and Richmond. The run was made entirely under the

supervision of the American Automobile Association, James A. Hemstreet being official observer, and the official sanction, No. 1080. The average gasoline consumption was 10.56 miles to the gallon though in places this was as high as 15.1 m.p.g. The average consumption of oil was 2.0497 qts. per 100 miles and of water 1.334 pts. per 100 miles. During the entire run the weather was unfavorable, the temperature ranging from 30 deg. above to 12 below zero, Fahr. The total load transported was 2039 lbs., and during the run no adjustments except minor ones on carbureter and gasoline feed line were made. One coil radiator spring and one fan belt were replaced. The vehicle was a stock Maxwell 1-ton truck.

National Price Increases

INDIANAPOLIS, Feb. 11—The National Motor Car & Vehicle Corp. has increased the prices of all 6 and 12-cylinder models, excepting the convertible sedan. The new prices go into effect immediately, in accordance with the prediction made at the New York and Chicago shows.

Prices follow:

Model	New Price	Old Price	Increase
6-cyl.			
7-pass. touring	\$2,150	\$1,995	\$155
4-pass. roadster	2,150	1,995	155
4-pass. phaeton	2,150	1,995	155
Sedan	2,820	2,820	...
12-cyl.			
7-pass. touring	\$2,750	\$2,595	\$155
4-pass. roadster	2,750	2,595	155
4-pass. phaeton	2,750	2,595	155
2-pass. dispatch roadster	2,850	2,750	100
Sedan	3,420	3,420	...

Automobiles Relieve St. Louis Car Strike

ST. LOUIS, Feb. 11—A street car strike lasting from Sunday, Feb. 3 to Thursday, Feb. 7, emphasized the thoroughness of the motorization of the city. More than 60 per cent of the workers got to their places of business in automobiles. The immediate lifting of all fuel and light restrictions on garages and repairshops was one of the beneficial results of the strike.

Local dealers and accessory stores had the busiest week on record, and passenger cars and trucks, of every description were brought into use.

Chandler 1917 Output 15,000 Cars

CLEVELAND, Feb. 11—The Chandler Motor Car Co. manufactured 15,000 cars in 1917, and showed, before deduction of Federal taxes, net earnings of about 34 per cent on the \$7,000,000 outstanding stock. War taxes amounted to \$7 or \$8 a share, and after allowing for these, the company earned its \$12 dividend rate more than twice over.

The foreign trade of the company included almost every country in the world outside the fighting nations of Europe, and those where embargoes exist. This foreign business, carried on in spite of high freight rates, is taken as an indication of the demand that will exist after the war.

Plan Uniform U. S. Registration

Secretaries of State Draft Law Making Operators' Licenses Necessary in All States

TOPEKA, KAN., Feb. 11—The Association of American Secretaries of State is the sponsor for a uniform registration measure, which will apply to all states. At the second annual meeting of the association held last fall a committee was appointed to draft a law, and this has now been done. It will be submitted to all secretaries of state, and if approved will be introduced into the legislature of every state in the union. The measure provides the usual registration of a car and makes compulsory the obtaining of a license to operate a car. It also requires manufacturers and dealers to make monthly reports of all cars sold. The measure is intended primarily to discourage the theft of cars and would require secretaries of states to maintain card indexes giving the engine number and other identifying marks on cars. Persons who destroy identifying marks are to be deemed guilty of a felony, and any dealer who sells a car with a defaced or destroyed engine mark shall be deemed guilty of a misdemeanor which is punishable by a \$500 fine. The measure also provides for headlamps with "dispersive lenses or glass mechanism or apparatus or otherwise so regulated as not to blind or dazzle other users of the highway or make it difficult or dangerous for other users to ride, drive or walk thereon."

Automobile Industry Uses Little Coal

WASHINGTON, Feb. 11—Although the automobile industry is one of the largest in magnitude, it uses a very small amount of coal. The last figures available are those compiled by the U. S. Bureau of Census for 1914, and these show that 41 other industries consumed more coal. Less than 500,000 tons were used in automobile and motor truck plants, while 31 other industries used more than 1,000,000 tons each.

CLEVELAND, Feb. 11—Frank Willis, president of the Hal Motor Car Co., denies the rumor that he has resigned. He said that a meeting was held recently, at which there was a discussion as to whether the company should liquidate. No final decision was reached, although it seems probable that liquidation will occur.

Jordan Ships 1727 Cars

CLEVELAND, Feb. 11—The Jordan Motor Car Co. manufactured and shipped 1727 cars during 1917, the total volume of business amounting to \$3,000,000. More cars were sold in the last three months than any other quarter of the year.

Michigan Manufacturers Fall Back on Drive-Aways

Characterize Freight Situation as Impossible

DETROIT, Feb. 14—Manufacturers here, and in Toledo, Flint, Jackson and other centers characterize the freight situation as impossible. It is almost useless to try to move cars by freight, and manufacturers have had to fall back entirely upon drive-aways. The only drive-away gate that is open runs through Toledo, as roads to Grand Rapids and the West are still impassable.

Rains have held up the Buick drive-aways, so that they are down to 25 or 30 a day, but the company has been able to ship about 200 cars daily by freight.

The road situation is temporary, and no doubt drive-aways will be back in full swing in a day or so. The Buick output runs from 300 to 350 cars a day, so that unless drive-away conditions are improved, the output will exceed delivery. Oldsmobile drove 40 cars through to Toledo on Saturday, 40 Sunday and 40 Monday.

Motor Transport Gets New Office

WASHINGTON, D. C., Feb. 11—The Motor Transport Section of the Quartermaster Corps is now located at Sixth and E Streets, 1421 I Street, Union Depot Office Building and the Treasury Building. Gen. Chauncey B. Baker, who heads the Motor Transportation Division, has moved with his staff, including Col. Edward Drake and Col. James Furlow, from the State War and Navy Building to the Georgetown University Building at Sixth and E Streets. This move follows the relieving of General Baker as chief of embarkation. Christian Girl as chairman of the Motor Transport section continues his office at 1421 I Street, although it is anticipated that these will be moved shortly to a temporary Government building. The draftsmen of this section are housed in the Treasury Building, and the engineering is handled in the office building of the Union Depot.

3 Companies to Make Nash Trucks

CHICAGO, Feb. 13—Arrangements have been made whereby the Nash Quad 4-wheel drive and steer trucks are to be manufactured for the Government by the National Car & Vehicle Corp., Indianapolis, the Paige-Detroit Motor Car Co., and the Hudson Motor Car Co., Detroit, under the Nash Motors Co. patents. It is understood that these are for the Ordnance Department, and are to be produced in large numbers. The tooling and equipment of the three factories to manufacture these is going forward and production will start as soon as possible.

Form Kalamazoo Munitions Co.

KALAMAZOO, Feb. 14—A munitions corporation is being formed here by industrial men in line with organizations formed in other industrial centers, such as the Detroit Shell Co. The corporation will have a capital of at least \$100,000,

10 per cent of which will be paid in. The business will be controlled by a board of directors of seven disinterested business men. There will also be a technical board of seven engineers acting in an advisory capacity on estimates, bids, distribution and completion of contracts.

Through centralized efforts, Jackson has already received war contracts amounting to \$8,000,000 and the plan has also worked out to advantage in Grand Rapids, Cadillac, St. Johns and other cities.

Washington Office for Highway Industries Association

WASHINGTON, D. C., Feb. 11—The Highway Industries Association, recently formed in Chicago, will hold a directors' meeting in Washington Feb. 16 to arrange for location of an office here and complete its organization. S. N. Williams, sales manager for the Garfield Motor Truck Co., chairman of the association, is already in Washington arranging for future activities. It is expected that the National Automobile Chamber of Commerce and the Motor and Accessories Manufacturers' Association will name directors for the new association this week, including one to represent the accessories makers, another to represent the motor car makers and a third the motor truck makers.

Retire \$4,000,000 Curtiss Notes

BUFFALO, Feb. 12—It is understood that the convertible 6 per cent notes of the Curtiss Aeroplane & Motor Corp. will be called soon at 102½. There are two issues of \$2,000,000 each. Retirement of the notes means that a possible increase in stock amounting to 80,000 shares will not be made.

License Rubber Exports

WASHINGTON, D. C., Feb. 11—The War Trade Board has issued a conservation list of materials which may not be exported to any country except under license and the list contains rubber and all commodities containing rubber. The War Trade Board will regulate the export of rubber tires by this form of license.

Claim Against Hal Motor

CLEVELAND, Feb. 13—A petition asking that the Hal Motor Car Co. be adjudged an involuntary bankrupt was filed in the Federal Court here yesterday by the Universal Machinery Co., the Keyless Auto Clock Co. and the C. H. Hanson Co. The petitioners presented claims aggregating only \$1,500.

Chicago Pneumatic Earns \$2,000,000

DETROIT, Feb. 14—The Chicago Pneumatic Tool Co. shows net earnings of \$2,000,000 for 1917. This is an increase of 30 per cent over 1916 and amounts to \$18 a share on the company's stock of \$7,500,000, of which \$6,485,800 is outstanding. The profits were calculated after deducting income and excess profits taxes.

Pennsylvania Crude Oil Advances 25 Cents a Barrel

Sets New High Price and Low Production Records

PITTSBURGH, Feb. 11—The price of Pennsylvania crude oil has been advanced an additional 25 cents a barrel, the present price being \$4. This is a new high record.

All other grades have been marked up 5 cents a barrel, as follows: Corning to \$2.85; Cabell to \$2.77; Ragland to \$1.25; and Somerset to \$2.60.

The advance in the price of crude oil at this time is construed by oil men as government recognition of the necessity of higher prices. For some time the production in Pennsylvania has been decreasing, and the pipe line in the Pennsylvania, Kentucky and Mid-Continent fields during the last two months have set a new low record for the last 10 years.

For some time there has been an agitation for higher prices among producers, but these demands were refused by the big interests, particularly the Standard Oil Co., because of the critical situation in the oil industry.

On the strength of the Pennsylvania increase, 10 per cent premiums were posted on Ohio, Indiana and Illinois products, establishing North and South Lima at \$2.18, Wooster at \$2.48 and Princeton and Illinois at \$2.22.

Packard Truck Prices Higher

DETROIT, Feb. 13—The factory prices of Packard trucks will be increased on March 1. The prices follow:

Model	New Price	Old Price	Increase
1-ton	\$2650	\$2150	\$500
1½-ton	3000	2800	200
2-ton	3400	3200	200
3-ton	4100	3900	200
4-ton	4450	4375	75
5-ton	5150	4900	250
6-ton	5400	5150	250

Supervise Liberty Engine Testing

DETROIT, Feb. 11—D. McCall White, vice-president and chief engineer of the Cadillac Motor Car Co.; H. M. Crane of the Wright-Martin Aircraft Corp.; John Wilkinson, vice-president and consulting engineer of the H. H. Franklin Mfg. Co., have been appointed a committee of three to supervise all testing work on the Liberty airplane engine. The duties of this committee are wide in scope, and they will pass final judgment on the engine, making their reports and recommendations direct to Howard Coffin, chairman of the aircraft board.

Ajax Earns \$1,955,293

TRENTON, Feb. 12—The Ajax Rubber Co. increased its sales during 1917 by 63½ per cent over 1916 and earned profits of \$1,955,293; from this Federal war excess profit and income taxes are to be deducted and amount to about \$495,000. The balance sheet as of Dec. 31 shows assets of \$11,920,449; the profit and loss account shows sales of \$13,828,282.

Washington News Letter

(Continued from page 379)

be considered and chosen for this position owing to Girl's exceptional capabilities and experience. His handling of the Class A, Class B and Class AA trucks has successfully demonstrated his ability to efficiently assume the duties of the prospective position co-ordinating the truck work of the army.

It is also likely that Gen. Chauncey B. Baker, who is head of the motor transport division of the Quartermaster Corps, has successfully displayed his ability will be the military chief to handle all motor truck requirements.

The fuel committee appointed a few weeks ago to hold further conference with the Fuel Administration regarding coal allowance for the industry has not yet called a meeting, and rumor has it that the Fuel Administration is becoming impatient and will not brook much delay. It was reported last week in Washington that one of the largest motor car makers made a flying trip to Washington and satisfactorily arranged the coal allowance for his own company.

Reports of Dissension

Reports of dissension between individuals of the automotive industries in Washington are frequent. The latest include difficulties arising between several truck makers submitting bids in the Ordnance Department which included approval of one make of truck in one office with blue penciling of the order in another with consequent wrangling between both companies and individuals until the order was finally placed for decision before Gen. Pierce, chief of purchases for the entire army.

There has been frequent discussion in Washington of the trouble caused by some companies which are taking every contract they can secure, regardless of what consequences may be, instead of confining their activities to a specific line. Reference has been made to several companies which are making everything from anchors to trucks. It is thought that the diversified activities reduce the efficiency of the companies so engaged.

Rubber Exports Licensed

The order of the War Trade Board prohibiting the export of commodities containing rubber except under license may have an important effect on the tire industry. At this writing it is impossible to ascertain how much, if any, limitation will be placed on the export of automobile tires.

The Presidential proclamation regulating import and export for the conservation of ship tonnage has not up to this time been approved and is still pending.

The War Credits Board, created to pass upon advances of funds to contractors engaged on war work, has approved advances of one hundred and fifty million dollars. This has stimulated the produc-

tion of war material greatly. Both large and small contractors have availed themselves of the system. The law permits advances not exceeding 30 per cent of the contract price for supplies.

When a concern holding a war department contract displays to the board its financial needs and complies with the act by giving adequate security, the advance is approved and the money given without delay—in some instances the same day the application is filed. Many manufacturers on account of delays caused by railroad congestion, etc., used up their own capital, borrowed all they could from banks and still did not have the necessary requirements to complete the contracts.

Offer Financial Help

In some instances they were on the verge of closing down because of inability to meet payrolls. Many such companies as these have been relieved by the advance payments. The board will be of a particularly great value to the manufacturer of limited working capital.

Secretary McAdoo's "War Finance Corporation Bill" to provide credits for industries and enterprises in the country necessary or contributory to the war and for the licensing of "non-essential" industries met with a halt in the Senate this week when Senator Lodge asked Secretary McAdoo for an explanation of the so-called non-essential industries. Secretary McAdoo has promised to take this up this week. His plan of licensing non-essentials is designed chiefly to prevent diversion of capital and labor to these industries.

War Department Reorganized

The Secretary of War has announced an entirely new schedule of operation for the war department designed to eliminate red tape and facilitate army activities. Under the new scheme there will be an executive division, war plans division, purchase and supply division, storage and traffic division and army operation division.

The purchase and supply division will be under a director of purchase and supplies and his duties will include direction of all purchases, procurement and production for the entire army, representation of U. S. army with the Allies, determination of purchasing and manufacturing priorities between the several departments within the war department and in relation to other U. S. Government agencies and also determination of preference to contractors for supplies in case of shortage of fuel or raw materials, supervision of all appropriations and other financial matters relating to purchase of munitions.

The storage and traffic division will control the transportation of all branches of the army, munitions and other sup-

plies of land and sea under a director of storage and traffic. His duties will include all movement of troops, provisions, all supplies during manufacture and after assembling to points of embarkation, interior points, overseas points and in and out of all storage, all inland traffic, including employment of army trucks and all storage of munition.

Pearce Rubber in Temporary Difficulty

PHILADELPHIA, Feb. 13—Henry C. Thompson, Jr., has been appointed temporary receiver for the Pearce Rubber Co. The action was taken because of difficulties which can be straightened out in a few months. Machinery ordered by the company for its new quarters did not arrive, and this, in conjunction with a coal shortage, necessitated the shut-down of the plant. There are plenty of orders on hand, which will be filled as soon as the company can operate again. The concern is solvent, and its assets exceed its liabilities.

Lincoln Completes First Liberty Engine

DETROIT, Feb. 11—The Lincoln Motors Co. has completed its first Liberty engine. This concern has built and equipped its plant in record time, having been incorporated in August, 1917, by Henry M. Leland and Wilfred C. Leland, who resigned as president and general manager of the Cadillac Motor Car Co. to engage in airplane manufacture for the Government in the plant formerly occupied by the Rands Mfg. Co. Since this time additional land and buildings have been acquired.

Government Position for Tripp

WASHINGTON, D. C., Feb. 11—Guy E. Tripp, heretofore chairman of the board of directors of the Westinghouse Electric & Mfg. Co., has been appointed head of the production division of the Ordnance Department with the rank of colonel. He will work directly under Secretary Baker.

Automotive Show Draws 178,270

(Continued from page 378)

gineers' dinner of the Minneapolis section, on Wednesday evening, when over 150 attended. The dinner was followed by a discussion on tractor fuels, which turned into a discussion on the merits of hot spot manifolds for burning kerosene in tractors. Already Minneapolis and Kansas City have been added to the winter circuit of S. A. E. meetings. The tractor makers in the Twin Cities are sure to make a big success of the Minneapolis section, which is the baby section of the S. A. E.

Dealers' meetings during the week were better attended than in former years, and while the number of dinners was not great, those held were good ones. Generally, several factory representatives were present and good talks on general conditions were given. No better opportunity could have been desired to get the dealers into the true war spirit than during show week.

General Motors Plants Co-operate for War Work

SAGINAW, MICH., Feb. 11—The Michigan plants of the General Motors concerns are co-operating in the manufacture of war materials, and the Peninsula Shell Co. will be used as an assembling plant in this connection. The parts for assembly will be supplied by other branches of the General Motors Co. The Saginaw Malleable Iron Co. will make all the malleable iron castings to be used, and is now installing equipment for this purpose.

Mutual Motors Buildings Bring \$212,000

JACKSON, MICH., Feb. 11—The purchase of the Mutual Motors buildings by the Susquehanna Finance Corp., of Buffalo, N. Y., winds up the affairs of the company which made the Marion-Handley, Marion and Imperial automobiles. The sum of \$212,000 paid for the plant will enable the referees in bankruptcy to pay about 30 cents on the dollar on outstanding obligations.

Roddis Veneer Ordered by France

MARSHFIELD, WIS., Feb. 11—The Roddis Lumber & Veneer Co. has received from the French government a contract calling for veneer for airplane parts. The company is filling contracts for various kinds of wood material for the United States government.

Oneida Truck Moves to New Factory

GREEN BAY, WIS., Feb. 11—The Oneida Motor Truck Co., Green Bay, has completed the transfer of the machinery, equipment and stock from the temporary quarters it has been occupying during the past year into its new and

Current News of Factories

*Notes of New Plants—Old
Ones Enlarged*

modern works at the southwestern limits of Green Bay, and the capacity is being increased to 100 Oneida trucks per month. The new factory is 150 x 476 ft. in size, affording 70,000 sq. ft. of floorspace, and is of fireproof construction, one story high, all departments being under one roof. A Pacific coast branch is being opened in San Francisco. Eastern trade is being handled through a New York branch established some time ago.

Heil Steel Bodies for Government

MILWAUKEE, Feb. 11—The Heil Co., manufacturer of electrically welded steel dump bodies for motor trucks, has received a second Government contract for a special design of dump body for use on truck chassis used in road building and bridge construction. The company recently completed a large addition to its plant, to be used exclusively for this work.

Bliss Mfg. Co. Adds Equipment

MILWAUKEE, Feb. 11—The Bliss Bros. Mfg. Co., 208 Manufacturers' Home Building, which established a plant about a year ago to produce tools and dies, is adding equipment and machinery to occupy all of the available area of the present quarters to meet its orders.

United States Trucks for Philadelphia Contractors

CINCINNATI, Feb. 11—The United States Motor Truck Co. has obtained an order for a fleet of 5-ton heavy duty trucks from the Keystone Construction Co., Philadelphia. The contract amounts to \$30,000,000.

Barnhill, Inc., Elects New Officers

NEW YORK, Feb. 10—J. D. Barnhill, Inc., 110 East 34th Street, has elected the following officers: Philip S. Dodd, president; Clayton DuBosque, vice-president and treasurer, and William T. Andrews, secretary and art director.

DIVIDENDS DECLARED

The Studebaker Corp. has declared a quarterly dividend of 1 per cent on common stock and 1½ per cent on preferred, payable March 31.

The Jones Motor Car Co., Wichita, Kan., has declared an initial 10 per cent stock dividend, payable to holders of record Jan. 10.

The American Radiator Co., Detroit, has declared the regular quarterly dividend of \$3 and an extra dividend of \$4 a share on common payable in Second Liberty Loan bonds. The regular quarterly dividend of 1½ per cent on preferred stock was also declared.

Autocar Chassis Price Raised

ARDMORE, PA., Feb. 10—The Autocar Co. has increased the price of the Autocar chassis from \$1,815 to \$2,050. Orders placed prior to Feb. 6 will be accepted at the old price.

Automotive Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Net Ch'ge		Bid	Asked	Net Ch'ge
*Ajax Rubber Co.	51	53	—2	Standard Motor Construction Co.	9½	10½	—½
*J. L. Case T. M. Co. pfd.	80	90	+9	Standard Parts Co.	69	70	—10
Chalmers Motor Co. com.	4	5	..	*Stewart-Warner Speed. Corp.	50½	52½	+½
Chalmers Motor Co. pfd.	25	40	..	*Studebaker Corp. com.	50	51	—3
*Chandler Motor Co.	82½	84	+1	*Studebaker Corp. pfd.	93	97	..
Chevrolet Motor Co.	118	120	—1	Swinehart Tire & Rubber Co.	35	39	—1
*Fisher Body Corp. com.	26	35	..	United Motors Corp.	25½	25¾	+½
*Fisher Body Corp. pfd.	75	85	—2	*U. S. Rubber Co. pfd.	56½	57½	—½
Fisk Rubber Co. com.	50	54	+3	*U. S. Rubber Co. pfd.	99	101	..
Fisk Rubber Co. 1st pfd.	98	103	..	*White Motor Co.	41	43	+1
Fisk Rubber Co. 2nd pfd.	60	70	..	*Willys-Overland Co. com.	18	18¾	—¾
Firestone Tire & Rubber Co. com.	96	98½	+½	*Willys-Overland Co. pfd.	78	79	—½
Firestone Tire & Rubber Co. pfd.	95½	97½	+½				
*General Motors Co. com.	138	139	+2½				
*General Motors Co. pfd.	83	85	—4				
*B. F. Goodrich Co. com.	47	48½	—½				
*B. F. Goodrich Co. pfd.	97	100	..				
Goodyear Tire & Rubber Co. com.	142	145	+9				
Goodyear Tire & Rubber Co. pfd.	99	101	+1				
Grant Motor Car Corp.	2	3	..				
Hupp Motor Car Corp. com.	2½	3	..				
Hupp Motor Car Corp. pfd.	75	80	..				
International Motor Co. com.	14	17	..				
International Motor Co. 1st pfd.	40	45	..				
International Motor Co. 2nd pfd.	17	20	+3				
*Kelly-Springfield Tire Co. com.	46	47½	+½				
*Kelly-Springfield Tire Co. pfd.	77	85	+4½				
*Lee Rubber & Tire Corp.	13	14	+1				
*Maxwell Motor Co., Inc. com.	29	30¾	+1¾				
*Maxwell Motor Co., Inc. 1st pfd.	62	65¾	+4¾				
*Maxwell Motor Co., Inc. 2nd pfd.	25	25	+2				
Miller Rubber Co. com.	140	160	+26				
Miller Rubber Co. pfd.	95	97	+1				
Packard Motor Car Co. com.	105	115	+25				
Packard Motor Car Co. pfd.	91	94	..				
Paige-Detroit Motor Car Co.	18	19	+1				
Peerless Truck & Motor Corp.	19½	20	+3				
Portage Rubber Co. com.	109	115	+3				
Regal Motor Car Co. pfd.	..	25	+2				
Reo Motor Car Co.	17	18	..				
*Saxon Motor Car Corp.	9	10½	—½				

*At close Feb. 9, 1918. Listed N. Y. Stock Exchange.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE ACTIVE STOCKS

	Bid	Asked	Net Ch'ge
Auto Body Co.	..	8½	..
Bower Roller Bearing Co.	17¾	18	+¾
Chevrolet Motor Co.	118	121	+1
Commerce Motor Car Co.	..	..	..
Continental Motor Co. com.	5¾	5¾	—¼
Continental Motor Co. pfd.	86	..	—1
Edmunds & Jones com.	..	..	..
Edmunds & Jones pfd.	..	..	..
Ford Motor Co. of Canada.	180	185	—7
Hall Lamp Co.	..	..	..
Michigan Stamping Co. com.	12½	..	..
Motor Products	..	..	..
Packard Motor Car Co. com.	100	105	+17¾
Packard Motor Car Co. pfd.	91	92¾	—½
Paige-Detroit Motor Car Co.	17¾	..	—½
Prudden Wheel Co.	15	16	..
Reo Motor Car Co.	17½	18	+½

INACTIVE STOCKS

Atlas Drop Forge	..	..	..
Kelsey Wheel Co.	..	..	..
Regal Motor Car Co.	..	..	..

Men of the Industry

*Changes in Personnel and
Position*

Toback Elected President of Redden Motor Truck Co.

CHICAGO, Feb. 10—Samuel S. Toback, who quite recently was appointed general manager of the Redden Motor Truck Co., has been elected to the presidency of the company.

A. E. Vinton has been made advertising manager of the National Motor Car & Vehicle Corp., Indianapolis. For more than 8 years, Vinton has been in the sales department, in charge of the company's export trade, and in 1910, when National cars were well-known among racing cars, served in his present capacity of advertising director. He will retain his position as export sales manager.

C. E. Pioch has been appointed chief engineer of the Fruehauf Trailer Co., Detroit. He was formerly connected with the Packard Motor Car Co.

H. F. Harris has been made industrial engineer of the Republic Motor Truck Co., Alma, Mich. He was formerly assistant branch manager and controller of the New York branch of the Willys-Overland Co.

A. W. Russel, president of the Russel Motor Axle Co., has become an assistant secretary of war at Washington with the huge salary of \$1 per annum.

A. T. Van Scoy, assistant secretary of the International Harvester Corp. of America, in charge of the company's Milwaukee office, has been elected president of the Milwaukee Assn. of Commerce. This is a reorganization of the Merchants' and Manufacturers' Assn.

C. W. Owston, formerly purchasing agent of the McCord Mfg. Co., Detroit, has been commissioned a captain in the Ordnance Officers' Reserve Corps. He will have charge of the Detroit district production office for the carriage section.

E. C. Grant has been promoted to the position of purchasing agent of the McCord Mfg. Co., Detroit.

Earl R. Martin has been appointed employment manager of the Templar Motors Corp., Cleveland. Formerly he held a similar position with the Curtiss Aeroplane & Motors Corp., the Rubay Co. and the Aluminum Castings Co.

F. D. Palmer has been appointed used car manager for the Reo Motor Car Co. of New York. He was formerly con-

nected with the New York branch of the Studebaker Corp.

Y. E. Stewart has been appointed sales manager of the Economy Motor Co., Tiffin, Ohio. Mr. Stewart has been connected with Cleveland manufacturers heretofore.

Frank C. Kip, formerly sales promotion manager of the Packard Motor Car Co., has returned to his previous position as sales manager of the Motor List Co., Des Moines. He will make his headquarters in Detroit.

H. W. Biddle and C. L. Ughetti have become associated with the sales department of the Silvēx Co., South Bethlehem, Pa. Biddle was formerly supervisor of sales with the Champion Spark Plug Co., and Ughetti in charge of the Indiana and Michigan territories of the same concern.

INCREASES OF CAPITAL

CADILLAC, MICH., Feb. 11—The Acme Motor Truck Co., formerly styled Cadillac Auto Truck Co., has increased its capital stock to \$1,000,000. The company is building a large addition to its plant, and plans to double its output in 1918.

INDIANAPOLIS, Feb. 11—The Weidely Motors Co. has increased its preferred stock from \$100,000 to \$500,000 to provide for enlargement of its plant and purchase of new equipment. The company recently increased its contract with the Cleveland Tractor Co. for airplane and tractor motors from \$3,000,000 to \$20,000,000. This covers a period of 3 years, and calls for 15,000 engines the first year, 25,000 the second and 30,000 the third.

AKRON, OHIO, Feb. 11—The Falls Rubber Co. has increased its capital from \$500,000 to \$1,000,000.

PORT WASHINGTON, WIS., Feb. 11—The Turner Mfg. Co., maker of engines and tractors, has increased its capital from \$150,000 to \$250,000. Much of the increase will be used for the expansion of the tractor department. An output of from 400 to 500 tractors is planned for 1918 without any reduction of the usual output of gas engines.

GREEN BAY, WIS., Feb. 11—The Oneida Motor Truck Co. has increased its capital from \$300,000 to \$500,000, to provide for increased production. An output of 1200 trucks has been planned for 1918. The company was organized last March.

COLUMBUS, OHIO, Feb. 13—The Columbus Varnish Co. has increased its capital to \$400,000.

CHICAGO, Feb. 13—The Vulcanized Products Co. is now capitalized at \$1,000,000, and in future will be styled Curtis Tire & Rubber Co.

New Companies Formed

*Latest additions to ranks of
Automotive Industries*

Noble Trucks to Be Made by New Indiana Company

KENDALVILLE, IND., Feb. 11—The Noble Motor Truck Corp. has been organized with a capital of \$1,000,000 to take over the business of the Noble Motor Truck Co., a \$30,000 concern formed last February. The Noble truck, which was designed and manufactured by the original company, will now be placed on the market. Plans are under way to enlarge the present output, and to erect a new factory building. The following officers have been elected: President, C. J. Munton; vice-president, J. L. Hauff; secretary, G. M. Patterson; treasurer, H. W. Bradtmiller. The directors include A. M. Jacobs, H. L. Postel, C. J. Munton, G. D. McLeod, J. L. Hauff, G. M. Patterson and W. G. Roberts.

TOLEDO, Feb. 11—The Pronovost Wheel Co., a new corporation with a capital of \$350,000, has purchased a 60-acre site for a factory. Until this is finished the company will manufacture an automobile wheel, which by means of torsion springs does away with the need for pneumatic tires, at the plant of the Central Machine & Tool Co. Dies have been completed, and quantity production will soon begin. The wheel was invented by Joseph Pronovost, who is president of the company.

NEW YORK, Feb. 9—The Commercial Motorbody Corp., organized to systematize the distribution of commercial bodies used by the motor trade, has leased the buildings that were to be occupied by the Essex Motor Corp., as the first unit of its warehouse system. The corporation will carry a large stock of bodies of all kinds to facilitate rapid delivery to commercial car distributors. Owing to the freight congestion, a warehouse system is greatly needed. The Detroit building covers 90,000 sq. ft. of floor space. Warehouse sites in Chicago and New York are now being considered and will be added before April 1.

Cygnat Rear Car Reorganized

BUFFALO, Feb. 11—The Cygnat Mfg. Co. has been formed to take over the business of the Cygnat Rear Car Co., which manufactures motorcycles with rear car attachments used for delivery purposes. The business also includes the production of similar vehicles intended for the transport of munitions and for other military purposes. The capital stock of the company is \$600,000 and the principals are Otto L., L. J. and E. A. Heintz.

Industrial Review of the Week

A Summary of Major Developments in Other Fields

Iron and Steel Industries Recover Slowly

Milder weather and a somewhat freer movement of traffic have given a more cheerful tone to iron and steel market reports, but the derangement of the whole machinery of production and shipment was so complete that many days will be required, even with no return of severe winter, for any approach to normal. It is to be remembered that excepting October and November, each month since April of last year has shown a decline in iron and steel output, so that the causes go deeper than the weather.

Steel works operations in the Central West are generally at 60 to 70 per cent of capacity and some steel plants, owing to freight embargoes and the large accumulation of unshipped product, are today doing little better than 50 per cent.

The industry continues to look to Washington for its impulse toward better or worse conditions. Its latest concern is the sharper restriction put upon exports, the War Industries Board having warned producers not to begin rolling such steel until export licenses covering it have been issued by the War Trade Board. Blast furnace, steel works and rolling mill products, the trade is now advised, are on the conservation list and all shipments are subject to the new restriction unless bills of lading had actually issued previous to Feb. 11.

This tightening of export regulations following recent efforts to make Government prices apply to certain iron and steel exports, even though not intended for war purposes, is disconcerting to those that have thrived on foreign trade.

Steel manufacturers are still much at sea as to the amount of steel they can supply apart from war uses, and the new business going on their books is small. It is plain that even in plates a considerable amount will be available for ordinary commercial purposes whenever capacity output can be reached. Both plate mills and fabricating shops have had their operations badly upset by the unreadiness of certain shipyards to take material as scheduled.

It will be some time before a new distribution is made of shell steel, deliveries on the 1,500,000 tons now under contract running to June 15. Meanwhile the British Mission is inquiring for 120,000 tons of plates, but modification of some of the unusual widths and lengths, 46-ft. lengths in many cases, will need to be made, in the same way that was necessary with our own Government's first orders, to insure early rolling.

The Government has divided among eight car builders the 4500 cars long under consideration for France, but the new car program for domestic roads drags unaccountably.

A New Service

Herewith AUTOMOTIVE INDUSTRIES supplies for the benefit of its readers a general summary of important developments in other fields of business. This is rendered possible by the editorial co-operation of leading industrial publications which are recognized authorities.

By compressing the general industrial situation into this form we hope to give our readers a clear and comprehensive idea of up-to-the-minute developments which they could otherwise secure only with considerable expenditure of time and effort.

A new ruling of the railroads that special permits for the movement of freight will be granted only on the application of the consignee, indicating need of the material and ability to unload promptly, is expected to help in reducing congestion.—*Iron Age*.

Maxwell Dividend in Scrip

NEW YORK, Feb. 14—The Maxwell Motor Co., Inc., has declared a quarterly dividend of 1¼ per cent on the first preferred stock, payable in first preferred dividend certificates, deliverable April 1 to stockholders of record March 15; it will be due April 1, 1920, with interest at 6 per cent payable semi-annually. The dividend certificates are subject to redemption at face value, with accrued interest.

Ohio Jobbers Organize

COLUMBUS, OHIO, Feb. 13—The Ohio Automobile Accessories Jobbers' Assn. was organized here recently by representatives of eleven jobbing houses in the Buckeye State, during a special meeting of the Ohio Automobile Trade Assn. The organization has for its object the good of the jobbing trade and the bettering of relations between manufacturer and jobber.

The organization will be affiliated with the National Assn. of Automobile & Accessory Jobbers with which practically all of the members are individually affiliated. A committee on membership and another on constitution and by-laws were named to report at a meeting to be held in Cincinnati March 18. The membership committee consists of H. G. Smith, Cleveland; A. I. Fishbaugh, Columbus, and Victor Moon, Toledo. The constitution and by-laws committee consists of J. C. Hipp, Cleveland; H. H. Brenner, Dayton, and E. C. Deardorff, Toledo.

Officers were elected as follows: President, H. M. Dine, Canton; vice-president, J. C. Hipp, Cleveland; secretary, Victor

Moon, Toledo, and treasurer, H. H. Brenner, Dayton.

These firms are represented in the organization: J. I. Cooper Rubber Co., Cincinnati and Columbus; Dine-DeWess Co., Canton; Fen-Far Co., Cleveland; Justus & Parker Co., Columbus; Griswold-Sohl Co., Columbus; Ohio Rubber Co., Cincinnati; Roberts Toledo Auto Co., Toledo Rubber Co., Toledo Tire & Supply Co. and the Union Supply Co., Toledo.

Faeh Returns to Baker R. & L.

CLEVELAND, Feb. 10—A. C. Faeh, who resigned as advertising manager of the Baker R. & L. Co. to become sales and advertising manager of the Osgood Lens & Supply Co. of Chicago, has returned to his former position.

Walsh Joins Randall Agency

DETROIT, Feb. 10—Robert Walsh, former advertising manager of the Maxwell Motor Co., Inc., has joined the Fred M. Randall Co., advertising agents.

Mackie Joins Saxon Sales

DETROIT, Feb. 9—J. H. Mackie has been appointed assistant sales manager of the Saxon Motor Car Corp. He formerly was president of the Mackie Motors Co. of Des Moines.

Detroit S. A. E. to Hear Schipper

DETROIT, Feb. 12—At the meeting of the Detroit Section of the Society of Automotive Engineers to be held at the Hotel Pontchartrain Thursday, Feb. 21, J. Edward Schipper, Detroit editor of The Class Journal Co., will deliver a paper entitled "Automotive Design and Transportation as Developed by the War." The paper will deal with efficiency in transportation, the influence of war time on the buying public, and improvements in design during the past year with reference to future trends.

Madden and Andrews Back from France

WASHINGTON, D. C., Feb. 11—Col. John F. Madden and Major Joseph Andrews, both of the American Expeditionary forces, have returned to Washington from France, where they have been engaged in motor transportation work under General Pershing. They are at present conferring with Col. Chauncey B. Baker, giving him messages from General Pershing, dealing with the motor truck experiences he has had in France.

Hupp Production 1250 a Month

DETROIT, Feb. 12—Since November the average production of the Hupp Motor Car Co. has been at the rate of 1250 cars per month, or between 40 and 50 per day.

Working Standards Set by Sharpe

Major-General Says Good Hours and Wages Essential to High Wartime Production

WASHINGTON, Feb. 13—"Industrial history proves that reasonable hours, fair working conditions, and a proper wage scale are essential to high production," says Major-General Henry G. Sharpe in a pamphlet which is being circulated under the title "Standards of Employment in War Work." The principal recommendations are:

1. A day's work should not exceed the customary hours in the establishment and should not be longer than 10 hours for an adult workman. For women, an effort should be made to restrict the hours to eight. Eight hours should be the limit for a shift.
2. Overtime is tacitly recognized as unnecessary and undesirable and should be discouraged. The employment of women on night shifts should be avoided as a necessary protection.
3. There should always be one day of rest in seven and the half-holiday on Saturday is advantageous throughout the year.
4. An effort should be made to maintain temperatures in workrooms and factories as nearly normal as possible.
5. Wages should not be lowered beneath an established standard and should be increased in relation to increases in the cost of living.
6. At least 30 minutes should be allowed for meals and this should be increased to 45 or 60 minutes if the working day exceeded eight hours.
7. No children under 14 should be employed under any conditions and children between 14 and 16 should not be employed more than eight hours a day and night work is prohibited.

Garford Overland Deliveries

LIMA, OHIO, Feb. 11—The Garford Motor Truck Co. is making one of the largest overland deliveries of trucks ever attempted at one time. A fleet comprising thirty-eight trucks of all the various models from 1½ to 7 tons capacity left the plant at Lima last Wednesday in the face of the most severe weather conditions imaginable. Battling with snow drifts mountain high over roads that had become well nigh impassable, these freight haulers are bucking their way over a long haul to New York City. The itinerary for this run includes Findlay, Fremont, Oberlin, Cleveland, Warren, Beaver Falls, Pittsburgh, Philadelphia, and over the Lincoln Highway to New York City.

Gier Steel Re-elects Officers

LANSING, MICH., Feb. 11—At the recent annual meeting of Gier Pressed Steel Co. stockholders all the old officers of the company were re-elected. These are: President, W. K. Prudden; vice-president, Harry E. Bradner; secretary and general manager, Burton S. Gier; treasurer, D. F. Edwards. These officers constitute the board of directors. A stock dividend of 25 cents per share was

declared. Since its last annual meeting the Gier Pressed Steel Co. has completed and equipped its new factory home on North Larch Street, at an expenditure of \$650,000. The company has an authorized capitalization of \$1,000,000 and has a substantial business in its regular lines in addition to government work.

Farm Tractors Follow Automobile Design (Continued from page 379)

cut out of the engine and there has not been any added cost by the weight reduction; but the company further states that nearly 600 lb. more could be cut out of the weight if the maker would accept a \$50 increase in the manufacturing cost.

Other makers have changed the rear wheel designs with a cut in weight into the bargain. Parrett has a new tractor; similar in design to the present one but with a new design of gearbox giving three forward speeds instead of two. It has enclosed internal gear drive to the rear wheels which gives a lighter construction. In this new model a new type of Buda engine is used which has forced feed oiling to all of the engine bearings and also has detachable cylinder heads. The price is \$125 more than the old model.

Each year sees the average tractor tend to the three-plow machine, although the four- and six-plow machines still have a following. The three-plow job is the one with the greatest field.

There are fewer of the huge traction engine types pulling ten or twelve plows than there were a year ago.

The use of the four-cylinder engine has made much greater progress in the last year than was expected. It is now the recognized type of tractor engine, and the two-cylinder opposed design and the two-cylinder twin design are not so strong in totals as a year ago.

Remy is another example of how the automobile industry is working in the tractor field and is showing for the first time a special electric motor governor and also a water- and dust-proof magneto, which is exhibited operating in a bell jar through which passes a veritable cloud of dust and also in a basin of water with a spray constantly playing over the magneto. Remy shows a complete tractor electrical system, including the electric governor, a generator and combined ignition and also a special starter, which is soon to be equipment on a new tractor design.

This indicates the entry of the thin edge of the wedge in the extended use of electric equipment on tractors, the possibility of women and perhaps maimed soldiers having to operate tractors lends importance to the desirability of having tractors as easily operated and controlled as possible.

A subject generally discussed with tractor makers is that the efficiency of the machine is cut down by the slow speed at which it must operate due to plow design and it is generally believed that the design of plows must be changed to permit speeds of 3 and 4 m.p.h. and maybe higher speeds can be made when the ground is suitable.

Official Sanction for Army Sales

Before Selling Supplies to Officers, Dealers Must See Proper Authority

WASHINGTON, Feb. 11—Purchasers of supplies for government-owned cars and trucks must have official sanction, and dealers must insist on seeing proper authority before selling supplies to uniformed soldiers or officers.

When an officer or private requires supplies for a car or truck owned by the government, he must first obtain from the officer in charge of his division, written permission to make the purchase. This officer obtains the authority from the highest officer in charge.

A dealer selling supplies to an officer or private, should ask to see this written authority, and make a note immediately of the organization number, the name of the officer who signed the purchase order, and the name of the purchaser. The bill should be sent by the dealer to the Depot Quartermaster in charge of that section of the country where the purchase is made. The bill should be an itemized account of all articles bought, and to get recognition, should give the organization number, the name of the officer who signed the purchase order, and the name of the purchaser.

Each dealer should be sure, in every transaction of this sort, to obtain a written receipt from the purchaser.

Teetor-Hartley Plant Closed by Coal Shortage

INDIANAPOLIS, Feb. 13—The plant of the Teetor-Hartley Motor Co. at Hagerstown, Ind., has been closed for one week because of a lack of coal. Industrial coal consigned to the company was confiscated before its arrival for other purposes. About 200 men were thrown out of employment.

Fuel Tanks and Other Sheet Metal Parts (Continued from page 365)

selves. These shells are usually made of No. 18 and No. 20 gauge material. The shell, of course, carries the hood lacing and the hood rod support. Formerly the shells were made with the regular offset hood ledge, but this is now being done away with, the hood being designed to rest directly on top of the shell.

In truck radiators it has been customary to use cast tanks and cast spacers or side members, but pressed steel is now coming in, as the makers are glad of a chance to reduce the weight on the front wheels. The pressed steel shell may be a little more expensive than cast iron, but it affords a better finish and it eliminates danger from frosts. Such a shell can be made just as rigid as required.

Utah-Nevada Highway Bill Passed by Senate

WASHINGTON, Feb. 11—The Senate has passed a bill granting to the Lincoln Highway Assn. a right of way 500 ft. wide, passing through the public lands of the United States from Tooele County, Utah, to Granite, Mo. and thence west through Nevada to Overland Canyon and 10 miles into the canyon, a total distance of between 400 and 500 miles. The bill also gives the association the right to take materials on adjacent public lands for the construction of the highway.

Before the bill becomes effective, a map of location and an outline of rules and regulations by which the association will govern the highway must be filed with and approved by the Secretary of the Interior. The association must construct the highway within 5 years after the Secretary of the Interior has given his approval.

It is understood that F. A. Seiberling has contributed \$100,000 for this work, John N. Willys \$50,000 and Carl Fisher \$25,000.

Boston A. A. Recruits Mechanics

BOSTON, Feb. 9—Through the efforts of the Bay State A. A. the Federal government obtained 100 skilled motor mechanics for the ordnance and avi-

ation forces last week. When the notification came, Secretary J. Franklin Brown called up members of the club, visited motor dealers, and secured the co-operation of the newspapers in a campaign to enlist the men. His efforts were more successful than the army officials expected, and he has received a letter of thanks from Secretary Baker.

Cincinnati Speedway to Be Preserved

CINCINNATI, Feb. 13—The Cincinnati Speedway Co. has been placed in the hands of Harry S. Leyman, former president of the company, as receiver. This action was taken to preserve the plant, which would have cost \$20,000 per year to maintain and on which the directors had previously decided there would be no racing during the period of the war.

Oil Situation Improves

HOUSTON, TEX., Feb. 10—With the end of labor troubles in the Gulf States oil production is increasing and many new wells are being drilled. The number of completions during January is the greatest in several months. The original discovery field at Spindle Top is showing evidences of revival and last week a well of 200 barrels daily flow was brought in at a depth of 800 ft. Oil operations continue to center around

Goose Creek, which is the largest producing area in the Gulf territory.

2000 Mechanics Trained Each Month

KELLY FIELD, SAN ANTONIO, Feb. 13—The training school for enlisted mechanics at Kelly Field is turning out graduates at the rate of 2000 a month and assigning them to squadrons for the care of engines and airplanes. New students come in and a class is formed every two weeks. The school is under the command of Major George E. Stratemeyer, who came here from Columbus, Ohio, recently. The mechanics' school here has been completely organized on a war basis and has three departments of instruction. They include a department of aeronautical instruction, a department of trades, and a department of motor instruction.

Rockford Dealers on Cash Basis

ROCKFORD, ILL., Feb. 13—At a recent meeting some of the principal members of the Rockford Automobile Dealers' Assn. voted to go on a cash basis and also to use the trade acceptance system. The Joslyn Automobile Co. has cut down the number of its charge accounts from 1250 to 207, and will do all other business for cash or acceptance, the latter being due on the 10th of the month following the date of purchase.

Calendar

ASSOCIATIONS

- April 18-20 — Cincinnati, Fifth National Foreign Trade Convention.
June 5-12—Hot Springs, Va. National Assn. Automobile & Accessory Jobbers.

SHOWS

- Feb. 9-16 — Bronx, N. Y., 2d Battery Armory. Bronx Automobile Dealers' Assn. J. J. Barrett, Mgr.
Feb. 11-16—Elmira, N. Y., Elmira Automobile Club. State Armory.
Feb. 11-16 — Kansas City, Mo., Kansas City Motor Car Dealers' Assn., Convention Hall. E. E. Peake, Mgr.
Feb. 11-16—Kansas City, Mo., Third Annual National Tractor Show.
Feb. 11-17 — Toledo, Terminal Auditorium. Toledo Auto Show Co.
Feb. 13-16 — Ft. Wayne, Ind., Automobile Trade Assn., Concordia Gymnasium.
Feb. 16-23—St. Louis, Mo., St. Louis Auto Mfrs. & Dealers' Assn. Robert E. Lee, Mgr.
Feb. 16-23—Albany, N. Y., Albany Auto Dealers' Assn., State Armory.
Feb. 16-24—San Francisco, Cal., San Francisco Dealers' Assn., Exposition Auditorium. G. A. Wahlgreen, Mgr.
Feb. 18-23—Syracuse, N. Y., Syracuse Automobile Dealers' Assn., State Armory. Harry T. Gardner, Mgr.
Feb. 18-23 — Nashville, Tenn., Nashville Auto Trade Assn., Hippodrome. Henry B. Marks, Mgr.
Feb. 18-23—Grand Rapids, Mich., Automobile Business Assn., Klingman Building. Ernest T. Conlon, Mgr.

- Feb. 18-23—Newark, N. J., N. J. Auto Exhibition, Co. G. First Regiment Armory. Claude E. Holgate, Mgr.
Feb. 18-23 — Springfield, Ohio, Springfield Auto Trades Assn., Memorial Hall. C. S. Burke, Mgr.
Feb. 18-23 — Waterbury, Conn., United Shows Co.
Feb. 18-23—Duluth, Minn., Duluth Automobile Trade Association. John J. Lane, Mgr.
Feb. 18-23 — Pittsfield, Mass., State Guard, State Armory. James J. Callaghan, Mgr.
Feb. 18-27—So. Bethlehem, Pa., Fourth Annual (cars 18-23; trucks 25-27), Coliseum. J. L. Elliott, Mgr.
Feb. 20-23—Quincy, Ill., First Annual Armory. L. B. Bartlett, Mgr.
Feb. 23-Mar. 2—Brooklyn, N. Y., Brooklyn Motor Vehicle Dealers' Assn., 23d Regiment Armory. I. C. Kirkham, Mgr. Passenger cars Feb. 23-Mar. 2; Trucks, Mar. 5-9.
Feb. 23-Mar. 2—Omaha, Neb., Omaha Auto. Trade Assn. Auditorium. Clarke G. Powell, Mgr.
Feb. 25 - Mar. 2—Indianapolis, Indianapolis Automobile Trade Assn., Diamond Chain Work Bldg. John B. Orman, Mgr.
Feb. 25-Mar. 2—Muskegon, Mich., Second Annual, Merrill Auditorium. John C. Fowler, Mgr.
Feb. 27-Mar. 2—Columbus, O., Auto Exhibitors' Co. W. W. Freeman, Mgr.
Feb. 27-Mar. 2 — Burlington, Iowa. Cars, Trucks & Accessories.
Feb. 27-Mar. 6—Boston, Mass., Salon, Boston Automobile Dealers' Assn., Copley

- Plaza Hotel. Chester I. Campbell, Mgr.
Mar. 1-15—Lyons, France, Third Sample Fair.
Mar. 2-9—Boston, Mass., Boston Auto Dealers' Assn., Mechanics' Bldg. Chester I. Campbell, Mgr.
Mar. 2-9—Pittsburgh, Pa., Automobile Dealers' Assn. of Pittsburgh, Motor Square Garden. John J. Bell, Mgr.
Mar. 4-9—Utica, N. Y., Utica Motor Dealers' Association, Inc., State Armory.
Mar. 6-9—Clinton, Ia., Clinton Automobile Dealers' Assn., Coliseum.
Mar. 6-9—Raleigh, N. C., Auditorium. John Kelley, Mgr.
Mar. 6-9—Watertown, N. Y., Automobile Dealers, Inc., State Armory. Arthur E. Sherwood, Mgr.
Mar. 6-9—Mason City, Iowa, Annual Car and Truck. Automobile Dealers' Assn.
Mar. 6-9—St. Joseph, Mo., St. Joseph Automobile Dealers' Assn., Auditorium. John Albus, Mgr.
Mar. 6-9—Sioux Falls, S. D., S. D. Automobile Dealers' Assn.
Mar. 11-16—Cedar Rapids, Ia., Cedar Rapids Auto Trade Assn., Auditorium.
Mar. 12-15—Fargo, N. D., Gate City Auto. Show Co., Auditorium. J. W. Murphy, Mgr.
Mar. 13-16—Warren, Pa., Warren Automobile Dealers' Assn., Russell Garage.
Mar. 14-16—Fort Fairfield, Me., Reed's Garage. R. F. Reed, Mgr.
Mar. 15-20—Great Falls, Mont., Montana Automobile Distributors' Association, Lexington Garage. A. J. Breitenstein, Mgr.

- Mar. 19-23—Vancouver, B. C., Western Canada Automobile Show Assn., Horse Show Bldg. D. A. Hamilton, Mgr.
Mar. 20-22—Houlton, Me., Second Annual, Houlton, Motor Car Dealers' Assn., Bangor St. Exhibition Hall. J. D. Luth, Mgr.
Mar. 20-23 — Holdrege, Neb., Second Annual of Southwest Nebraska.
Mar. 20-23 — Trenton, N. J., Trenton Auto Trade Assn., Second Regiment Armory. John L. Brock, Mgr.
Mar. 25-30—Bridgeport, Conn., Fourth Regiment Conn. Home Guard State Armory and Casino. B. B. Steiber, Mgr.
Mar. 30-Apr. 6—Hartford, Conn., Eleventh Annual, Hartford Automobile Dealers' Assn., Inc. State Armory. B. F. Smith, Mgr.
Mar. 30-Apr. 6—Atlantic City, N. J., Second Annual, Garden Pier. S. W. Megill, Mgr.
Apr. 6-13 — Red Bank, N. J., Monmouth County Auto. Dealers' Assn., Armory. E. C. Von Kattengell, Mgr.
Apr. 9-13—Stockton, Cal., Third Annual San Joaquin Auto Trade Assn. Samuel S. Cohn, Mgr.
Apr. 17-20—Calumet, Mich., Upper Peninsular Show, Copper County Automobile Dealers & Garage Owners' Assn., Coliseum.
Sept. 23-28 — Chicago, National Accessory Show for Fords, Coliseum.

ENGINEERING

American Society of Heating and Ventilating Engineers.
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